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The PHOTOFACT Servicer

JUNE 1, 1948 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ VOL. 4, No. 40

ROBERT M. ELLIS, *Editor*

CLASS TEACHING

Mr. J. P. Graham, the Editor, has called our attention to the following item in the "Associated Radio Service Dealers' News" for April.

"On recommendation of the Technical Committee, the members voted to use the Howard Sams Television Course for their Television Training course which will start sometime during the month of May."

A number of other service organizations have indicated their intention of using the PHOTOFACT Television Course as the basis of class teaching and discussion. We think the idea is fine, and the post-lecture discussions provide the opportunity of clarifying points and interchanging ideas. The PHOTOFACT Course is equally good for class lecture and self-study; and because of its serial presentation, it is always up-to-date. Service technicians have been handed a challenge—whether or not they can service a new electronic product. We say they can; and we believe that the PHOTOFACT Television Course will prove one of the most valuable aids in acquiring the "know-how." Don't miss an issue.

Incidentally, the "News" is the organ of the Associated Radio Service Dealers, a live-wire organization of electronic technicians of Columbus, Ohio; if you live in this vicinity you should get acquainted. The Association may be addressed at 2552 North High Street.

★ ★

THE BROADCAST BAND INTERFERENCE PROBLEM

A PHOTOFACT subscriber, Joe Beatty, of Beatty's Radio Shop of Punxsutawney, Pennsylvania, asked us for a letter on broadcast interference—something he could show to his customers to prove that poor reception in the form of severe fading, distortion, multiple station reception and interference encountered in evening listening was not necessarily caused by any fault of the receiver or imperfection of adjustment, but was rather due to conditions on the broadcast band beyond the control of the service man or set owner. To help Mr. Beatty, we dug up a few facts, and these were so interesting we thought you would like to have them too. Here is what we told Mr. Beatty:

"According to the March, 1948, issue of 'FM and Television' magazine there are currently 1,969 broadcasting stations on the air or under construction for operation on the 105 channels of the broadcast band between 550 and 1,600 kc.; or an average of over 18 stations per channel. This is an average; the actual crowding on the higher frequencies is much worse. Selecting a frequency at random, the writer counted a total of 129 stations listed in the Spring '48 issue of 'White's Radio Log' as operating on 1,230 kc. The average radio set will discriminate against an unwanted station operating on a different wavelength, but it possesses no discrimination at all against an unwanted station on the same wavelength.

"Radio waves in the AM broadcast band travel two ways. One path is over the surface of the ground, and forms the so-called 'groundwave.' At night these waves also are propagated by reflection from one of the layers of the ionosphere or 'Heavyside Layer,' which are heavily ionized partially conductive zones in the upper atmosphere. The reflecting surfaces of these layers are turbulent, so that reflections are continuously being disturbed—the effect can be compared to the optical reflection of an object in a moving pool of water. This means that radio waves arriving from the more distant stations at night are being distorted in intensity and phase. When the signal of one station weakens coincident with an increase in signal strength of another station on the same wavelength, the second station apparently crowds the first station off the dial.

"There is no measurable difference in the functioning of a radio receiver between daytime and night. The difference in performance is due to the change in the medium through which the wave is propagated. The situation will continue to get worse, not better, for the reason that the F.C.C. continues to license more and more stations for service on the broadcast band.

"The situation is not nearly as bad on the FM band, because of the so-called 'capture effect' in FM receivers, by which a signal from a stronger signal completely obliterates a weak one. Also the ultra-short waves used for FM transmission are reflected but little from the ionosphere."

Perhaps our comments will be of some help to you in discussing your local reception problems with your customers.

★ ★

HERE'S ONE JUST RECEIVED

MID STATE RADIO SERVICEMEN'S ASSOCIATION
OF PENNSYLVANIA

HARRISBURG, PENNSYLVANIA

April 10, 1948

MR. H. W. SAMS,
Howard W. Sams & Co., Inc.,
Indianapolis, Indiana.

Dear Friend Howard:—

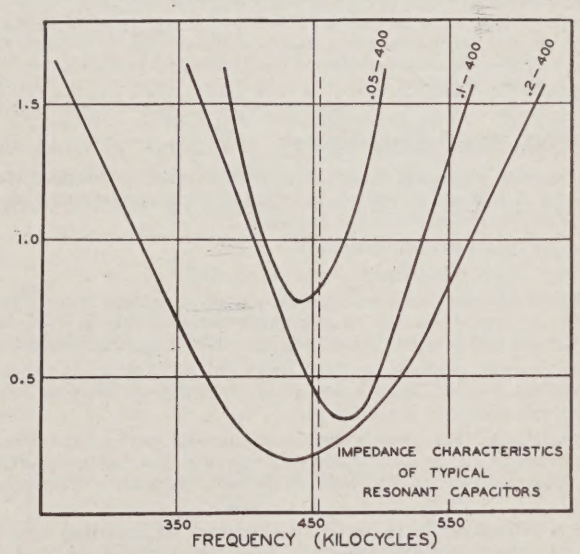
Congratulations on your new project of the Saunders' Television Course.

PHOTOFACTS are still 'way out in front, as far as we're concerned. Best of everything.

Sincerely,

(Signed) T. L. CLARKSON
Vice-Chairman

★ ★



RESONANT PAPER CAPACITORS

Sprague Electric Company has called our attention to the various uses of their "Resonant Condensers." The condensers, unlike the usual tubular paper units are inductively wound and are designed to be self-resonant at the generally accepted standard intermediate frequency of 455 k.c. The result is an extremely low impedance at the resonant frequency as shown by the graph. Resonant condensers at present are issued only in three values—0.05 mfd., 0.1 mfd. and 0.2 mfd., and in one working voltage, 400 volts d.c. The condensers are supplied in yellow tubes and are marked "Resonant" for ready identification. As explained in a previous note (SERVICER 22) replacement of resonant condenser should not be made with a paper-dielectric condenser of standard type since such a substitution may lead to feedback and oscillation. Always check your PHOTOFACT Folders for replacement recommendations.

Sprague tells us that in addition to their use as specified replacements, Resonant Condensers are excellent for general service as line isolating condensers, and when so used will replace both common condensers, and combinations of a condenser and a series connected coil. It is asserted by Sprague that the stability of the usual AC-DC receiver will usually be improved by the use of a resonant condenser in the line isolating position.

A line isolating capacitor is the one connected between B-minus and the receiver chassis in "Underwriter Approved" type sets.

★ ★

TUBE PLACEMENT GUIDE

Frankly, we are proud of the overall accuracy of the Howard W. Sams Radio Receiver Tube Placement Guide. However to both our printer and our proofreaders a "3" looked enough like an "8" to confuse one group of Westinghouse listings. Owners of the Tube Placement Guide, TP-1, first run of the First Edition are requested to make the following changes in the index.

Westinghouse Model	Listed Diagram	Correct Diagram
H104	1881	1831
H105	1881	1831
H107	1881	1831
H108	1881	1831
H110	1881	1831
H111	1881	1831
H137	1881	1831
H138	1881	1831

That something was wrong with the original listing is immediately apparent since there are a total of 1880 chassis diagrams in the book.

★ ★

NEW CUMULATIVE INDEX

This PHOTOFACT Set No. 40 contains a Cumulative Index listing the contents of all PHOTOFACT Folders issued to date.

Some shops may need additional Indexes—for convenience in filing, or where several employees use a common library. In such cases, just drop us a card—additional copies of the Index are available without charge on your request.

★ ★

WANTED: Field Experiences

It's as easy as rolling off a log to get your PHOTOFACT Folders without charge. A free set of Folders is awarded for every service hint or shop procedure published in the SERVICER.

There are only two requirements—

(1) Your "Field Experience" must be original.

(2) It should cover information not readily apparent from a routine voltage, resistance or alignment check of the receiver. Mechanical troubles and record changer data is especially welcome.

In other words, profit by sending us the material you have had to learn "the hard way." Don't worry about grammar or sentence structure. We will edit your entry for you.

It's a rare shop that doesn't encounter unusual service experiences. Profit by these. Send us your "Field Experiences." You will help others as you help yourself to the tops in service literature—"PHOTOFACT Folders."

Since it is impossible to verify the accuracy of contributions, we cannot be responsible for either the diagnosis made of the receiver trouble, or the results which will be obtained by following the suggested repair routine. All contributions become the property of Howard W. Sams & Co., Inc.

★ ★

WEBSTER-CHICAGO 56 RECORD CHANGER
Photofact 477-36, Set 17

"Complaint: Failure to change records.

"The manufacturer has substituted a heavy collar as a weight to replace the velocity trip spring and tension collar, PHOTOFACT Items 67 and 66. This weight did not hold velocity trip arm (Item 69) tight enough to trip record changer.

"Remedy: Place Scotch Masking Tape on top of the pickup arm raising disc (Item 70) where the velocity trip arm rides. The masking tape gives enough friction to make the trip arm do its job perfectly."

Submitted by: Mr. Wm. E. Rogers, Radio and Electronic Service, Main Street, New Salem, Pennsylvania.

★ ★

EMERSON 520
Photofact 462-1, Set 2

"The complaint was a funny noise like a microphonic tube. I went through the usual procedure of testing and tube-tapping. Nothing happened and I had about decided it was the customer's imagination or some outside interference at his location. However, I decided to check alignment before taking it back. To make the dial track properly, the antenna r.f. portion of tuning condenser trimmer had been loosened way out to the minimum trimmer capacity.

"Imagine my amazement when I accidentally snapped the little trimmer plate and got a beautiful audio note which lasted as long as the volume control was turned up—a sort of vibrating reed electronic organ effect. I remedied the trouble by backing the plate up tight against the trimmer screw by putting a small rubber wedge in under it."

Submitted by: Mr. Harold Bover, Raymond S. Roberts, Inc. 230 Canal Street, Brattleboro, Vermont

★ ★

SETCHELL-CARLSON 416
Photofact 462-14, Set 2

"We have done considerable service on this particular model and we find the following troubles to be more or less prevalent.

"An objectionable hum, something like a leaky or shorted output tube (50L6, etc.), may often be traced to a bad ground connection on the 12SQ7 socket. This socket is at the end of the series filament hook-up and will cause hum if not properly grounded. A simple repair is to place a soldering lug and a lock washer under the nut on the nearest i.f. can and run a wire from this to the socket. The lock washer will serve to dig into the chassis and make good connection.

"Noise, such as a noisy tube and appearing to be either the 12SA7 or 35Z5GT, is due to a poor connection between the gang condenser and chassis. Many of these models use an aluminum chassis and the rivets holding the gang condenser to the chassis do not afford a good enough connection. To repair this simply run a short piece of shielding from one of the screws on the back of the gang and solder to a good ground underneath the chassis. In extremely bad cases, it may be necessary to run a ground 'bus' through the entire set connecting all tube sockets, etc., to insure a good ground throughout the set.

"Many of the early sets in this series (416) were brought in with the complaint of a weak or no signal at all. A complete alignment would bring these sets back to normal but the same trouble would develop again in a short time. The serviceman is inclined to believe that the customer has been tampering with the trimmers but this is not the case. The first sets in this series used i.f. transformers in which the coils were impregnated with a wax which had too low a melting point. Due to the fact that the i.f.'s are mounted upside down the heat from the tubes would cause this to melt and run down onto the trimmers and detune them. The same trouble may occur when some standard replacements are used. The company now has a replacement which is designed and built for operation in this set. In replacing these i.f.'s take care so as not to cross the plate and grid leads as this may cause whistling or oscillation especially if the 12SK7 tends to be microphonic."

Submitted by: Mr. J. Kendall Benzing
Monona, Iowa

PUBLICATION DATES

When will other sets of PHOTOFACT Folders be published?

Volume 5—Set No. 41 ..... **July 15**
Volume 5—Set No. 42 ..... **July 15**
Volume 5—Set No. 43 ..... **Aug. 15**
Volume 5—Set No. 44 ..... **Aug. 15**

If you have been unable to get any issues of PHOTOFACT *Folder Sets, send your order and money directly to us and we will see that you are supplied.*

TELEVISION POWER SUPPLIES

The peculiarities of power requirements in the several parts of representative television systems make necessary the use of power supplies more complicated than those normally found in other radio and electronic devices. In general, it is necessary to provide for at least two separate and basically different load conditions.

1. A low-voltage, high-current system to power oscillator, amplifier, and similar stages where applied potential does not exceed approximately 450 volts. In addition, some receivers power modulation and deflection systems from this source.

2. A high-voltage, low-current system to supply the accelerating anode potential, and, in some applications, DC deflection potentials, for the cathode-ray or picture tube.

LOW-VOLTAGE, HIGH-CURRENT POWER SUPPLY: What might be termed the signal reception portion of the receiver, which includes sound and video amplifier or control tubes, presents a power requirement not greatly different in voltage range from that of other radio devices, and, therefore, this portion of the television receiver power supply system is very similar to those used in large radio sets.

In general, the voltage requirement is no more than the conventional 450-volt value. The current required, however, is frequently much greater than that necessary for radio operation: and, in addition, there is also a necessity for rather good supply regulation. This need is occasioned by the operation of "sawtooth" oscillators for deflecting the electron beam of the cathode-ray tubes from this source. These oscillators tend to produce currents in the power supply system, which, if not properly filtered, would appear as serious modulation hum in the beam control and sound circuits.

It is not unusual to encounter power supply currents for the low-voltage application of as much as 300 milliamperes. Television receivers produced to date may employ from one to three rectifiers for this low-voltage, high-current supply, the number, of course, dependent upon the current requirement and the designer's preference as to voltage and current distribution. Thermionic and selenium rectifiers have been used up to this time in circuits which largely duplicate those for equivalent radio set power supplies, including full-wave transformer types and transformerless half-wave doubler designs.

Figure 29 provides schematic diagrams of representative low-voltage, high-current supply systems.

HIGH-VOLTAGE, LOW-CURRENT POWER SUPPLIES: The high-voltage supply differs considerably from the supply just discussed in that the current requirement is very small, usually in the neighborhood of 300 micro-

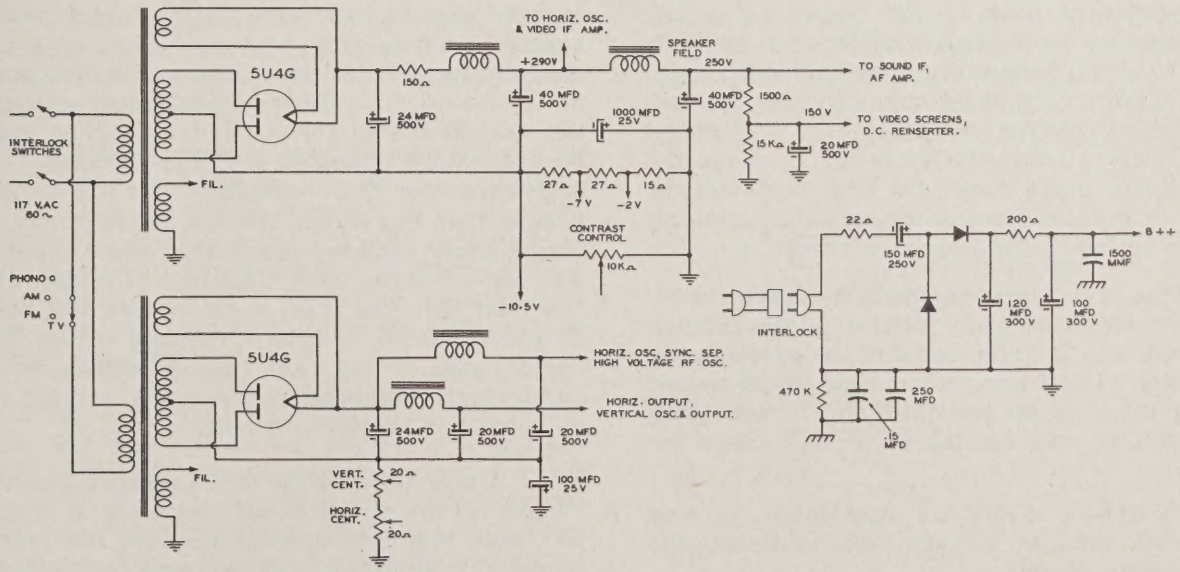


Fig. 29. Left - Low Voltage Transformer Type Supply. Right - Half-Wave Doubler Low Voltage Supply

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amperes, while the voltages employed may range to extremely high values, especially in television receivers using projection-type cathode-ray tubes. Receivers currently in production may use accelerating potentials from 3,000 to 30,000 volts.

SAFETY PRECAUTIONS: Since these high-voltage power supplies represent extremely dangerous shock hazards, perhaps it might be well to consider normal precautions to be followed in working with them.

First, locate your bench well away from metal objects, or wiring, which might provide an accidental contact to ground or a voltage source. Don't use metal bench tops. If you have a concrete floor, it is essential that it be covered with a substantial rubber mat, or other good insulating material, in an area sufficient to preclude any possibility of stepping off the mat during normal service operations. The mat isn't a bad idea even if you don't have a concrete floor.

Second, don't attempt high-voltage measurements unless they are actually necessary. It is the general opinion, on the basis of experience to date, that resistance measurements are adequate to identify power supply troubles in at least 90% of all failures.

In the event that it is necessary to measure high potentials, do so in the approved manner. With power switch off and plug disconnected, hook up the test lead to the ground or low potential side of the circuit. If a clip lead is to be used for connection to the high potential side of the circuit, make this connection with power off, using one hand only, so that if a residual charge remains there will be no possible circuit through the body. It is usually advisable to make sure that the high-voltage supply is completely discharged before making any connection to the television receiver.

If a probe-type instrument is to be used with the power supply operating, always use one hand only for placement of the probe to the test point. Keep the other hand in the pocket so that there is no possibility of contact with the result of establishing a circuit through the heart.

In other service operations, such as alignment, etc., it is advisable to disable the high-voltage circuit.

Try to detect the fault by individual component diagnosis. There are nine mental operations to one manual operation in the testing of any electronic circuit. Think - then act! You owe it to yourself and your family to take all necessary precautions.

TYPES OF HIGH VOLTAGE SUPPLIES: At the time of going to press, there are four basically different types of high-voltage power supplies being used in commercial television receivers:

A. The conventional, or "brute force," 60-cycle half-wave power supply system.

B. The r-f power supply system which uses an r-f oscillator as a high frequency voltage source, steps up this voltage through a suitable RF transformer, and then rectifies it for application to the accelerating anodes.

C. The "horizontal flyback" or "kick-back" type high-voltage supply employing the pulse voltage generated by the collapsing field in the primary of the horizontal deflection transformer. This pulse voltage is stepped up, rectified, and supplied to the accelerating anodes.

D. The pulse-type power supply using a blocking oscillator whose pulses then trigger the plate current of a power tube. This sudden change of plate current is fed to a transformer, thence to a rectifier or a series of rectifier-doublers or triplers to produce the high voltage.

"BRUTE FORCE" POWER SUPPLY: Almost all pre-war and some post-war television receivers use the half-wave "brute force" power supply. In theory and operation, it is not essentially different from power supplies commonly used in ordinary radio receivers with the exception that the power transformer must be adequately insulated for high voltages. The half-wave circuit is employed for the obvious reason that through its use the high voltage transformer may be held to the lowest possible number of turns and smallest physical size. The fact that the filter must be effective for a 60-cycle hum or ripple, instead of the 120-cycle ripple of the full-wave supply, is not particularly bothersome since the current requirement is relatively small.

A schematic diagram of a representative "brute force" power supply appears in Figure 30. Note that this system employs one transformer to supply all voltages for receiver operation. Winding "A" supplies the heater current for the type 2X2 rectifier. Any tube used in this application must be capable of

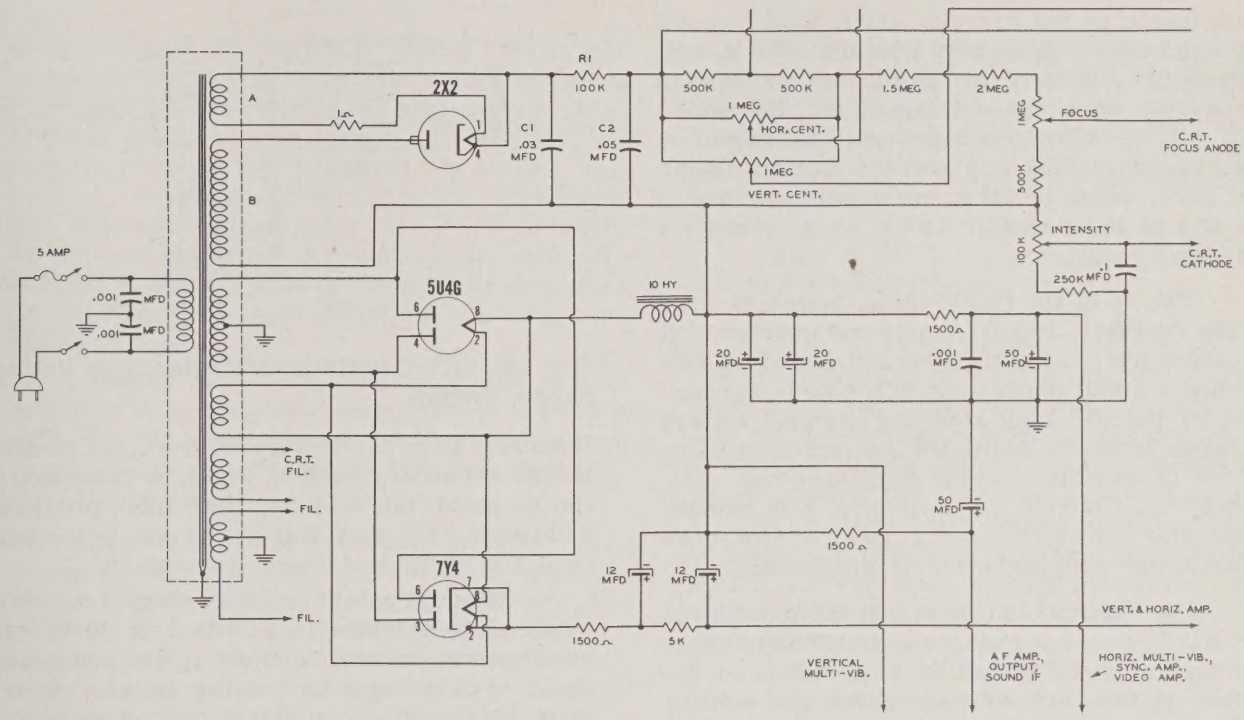


Fig. 30. "Brute Force" Type High Voltage Power Supply

withstanding extremely high inverse voltages. Winding "B" supplies plate potential for the 2X2 rectifier and ultimately the accelerating anode voltages. Capacitor C1 is the input filter unit for the high voltage supply, resistor R1 the filter resistor, and C2 the output filter capacitor. Through a bleeder network, the various voltages are picked off for tube control functions, such as centering, focusing, and brilliancy. The remainder of the power supply represents conventional full-wave design practice with the exception that the outputs of all branch supplies are additive.

Figure 31 shows a variation of the brute force power supply to provide approximately 12,000 volts DC through the use of a half-wave doubler circuit. A pair of 2X2 rectifiers is used in a conventional doubler system fed by a high-voltage winding of the power transformer. This application uses a separate high-voltage supply transformer.

RF POWER SUPPLY SYSTEM: The RF Oscillator High-Voltage Power Supply is frequently used, especially where electrostatic deflection is employed. It is compact, requiring only two tubes, and is independent of deflection system of the receiver. Power is generated by an r-f oscillator operating at frequencies ranging between 50 and 500 KC, the r-f output is stepped up through transformer action to several thousand volts, and then rectified. Due to the low current drain on the power supply, the output voltage is nearly equal to the peak voltage applied to the rectifier.

The oscillator usually employs a power output type tube which is capable of generating 10 to 15 watts of r-f energy and is normally connected as a tuned-plate oscillator with tickler feedback. The plate circuit is tuned to the natural resonant frequency of the high-voltage winding, providing a minimum of load on the oscillator circuit. One of the features of this power supply is the fact that any change of

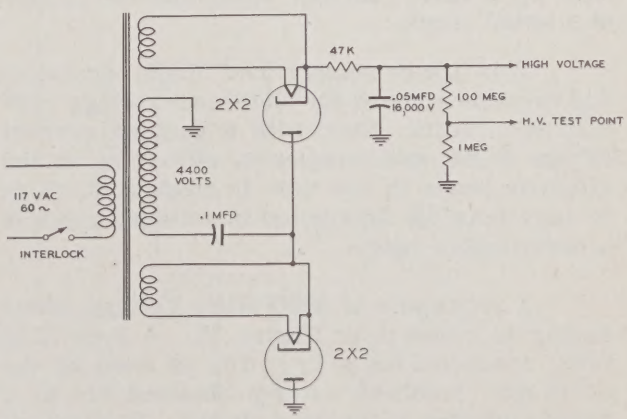


Fig. 31. High Voltage Supply Employing Doubler Circuit

capacitance in the circuit, which would result if a hand were inadvertently placed near it, will reduce the output of the oscillator and lessen the danger of a high-voltage shock. Nevertheless, all aforementioned precautions should be taken when making any voltage measurements and care should be taken not to get too close to the cap of the rectifier tube as a severe r-f burn may result.

The 8016 or 1B3GT tube, which is used as the rectifier, requires only one quarter watt of power for heating the filament and since this is only a small percentage of the power generated by the r-f oscillator, the filament voltage is taken from an additional secondary winding of one or two turns on the oscillator coil. Obtaining the filament voltage in this manner eliminates the need for a large iron-core transformer with high-voltage insulation.

Care should be taken that the position of this winding is not changed because any change in coupling would result in an increase or decrease in filament voltage. Since the voltage applied to the filament is r-f and there is no practical method of measuring its heating efficiency, a reasonably accurate check may be made by a visual comparison of the brilliance of the heater on a similar tube with its filament connected across a 1.6 volt dry-cell battery. The filament of the 8016 tube is quite easily paralyzed by a momentary overload and it is suggested that another tube be tried if trouble is suspected in the rectifier circuit.

Due to the frequency of the r-f voltage and the low-current drain (approximately 200 to 400 microamperes) on the power supply, a very small value of capacitance is required for filtering the output voltage. Likewise a large value of resistance up to 500K ohms may be used as a filter, further lessening the chance of a lethal shock.

This power supply has good regulation and there is no need for additional voltage regulation circuits. Even with a varying current from 0-200 microamperes, occurring as the electron beam in the tube is modulated, there is less than 5% fluctuation in voltage, which is a permissible range.

A schematic of an RF High-Voltage power supply is shown in Figure 32. A type 12A6 tube, connected as a triode, is used as the oscillator, feedback being obtained from a tickler winding in the grid circuit. The voltage is stepped up in the secondary winding and fed to the plate of the rectifier tube, rectified and

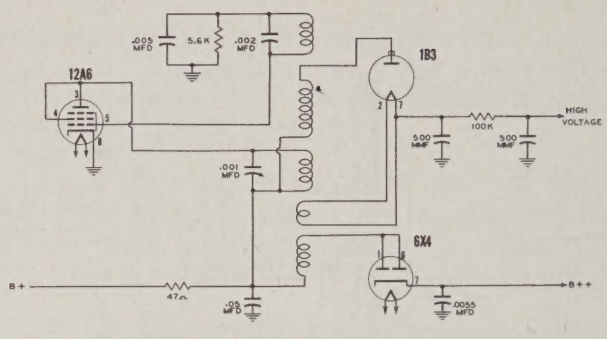


Fig. 32. RF Oscillator-Rectifier High Voltage Supply System

filtered. This particular receiver has an additional secondary winding which is connected to the plate of the 6X4 rectifier tube, providing additional "B" plus voltage for use in the vertical and horizontal sweep generators.

Although most receivers employ a tickler winding for obtaining a feedback to sustain oscillations, another method in use eliminates the need of a separate winding on the transformer. Feedback is obtained through capacitive coupling to the plate of the rectifier by placing a spring around the rectifier tube at the exact position giving correct feedback. The position of this spring is critical and instructions for positioning it should be followed closely.

RF power supplies should be shielded to prevent radiation into the receiver. Such radiation causes "birdies" in the sound channel and r-f bars to appear on the screen. This shield also gives protection against shock.

Figure 33 shows a typical complete RF high-voltage power supply system.

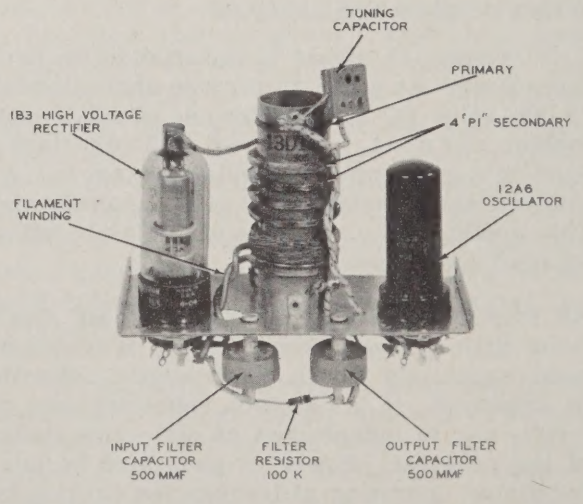


Fig. 33. Typical RF High Voltage Supply (Shield Cover Removed)

HORIZONTAL FLYBACK HIGH VOLTAGE SUPPLY SYSTEMS: This method of obtaining high voltage makes use of the high-voltage pulse created in the plate circuit of the horizontal amplifier during retrace time. In using this system, relatively few additional components are required beyond those that would normally be necessary, since all magnetically deflected receivers make use of a matching transformer between the horizontal output and the horizontal deflection coil.

Another reason for employing this system is that it guards against modulation of the video signal by stray energy from the high-voltage supply, since the screen is blanked out during the retrace time.

The addition of two windings to the horizontal matching transformer makes possible the use of this system. When the quick collapse of plate current through the horizontal deflection amplifier takes place, due to the sawtooth of voltage on its grid, the primary winding, which is part of the plate circuit of the horizontal deflection amplifier, will have produced across it a relatively high pulse voltage because of self induction.

By adding an auto-transformer winding to the primary of this deflection transformer, the pulse voltage may be stepped up to any desired value. This high voltage is then fed to the plate of a hot cathode type rectifier, rectified and filtered, and becomes the high accelerating potential for the picture tube.

The second additional winding on this transformer consists of one or two turns, which provide the filament power for the rectifier tube. This is possible since the current requirements of the particular tube developed for this purpose is low.

Figure 34 shows a representative Horizontal Flyback System.

The transformer itself is of unique design employing pressed powdered iron in the form of a shell about the windings. It is possible to use powdered iron for this transformer since the horizontal scanning frequency is 15,750 cycles per second. The time of one cycle is, therefore, approximately 63 microseconds. Of this, 53 microseconds are used up in the forward scan and the remaining 10 are employed for flyback and starting the next horizontal line.

The transformer resembles a design which one would expect for the handling of power at low radio frequencies. The windings are of the universal type and are well impregnated. The parts of a typical horizontal flyback transformer are shown in Figure 35. Since the frequency is high and the current drain low, the filtering required on this high-voltage supply is very small. Actually, the output filter capacity is often realized by using the capacity between the outer and inner layers of aquadag coating on the picture tube.

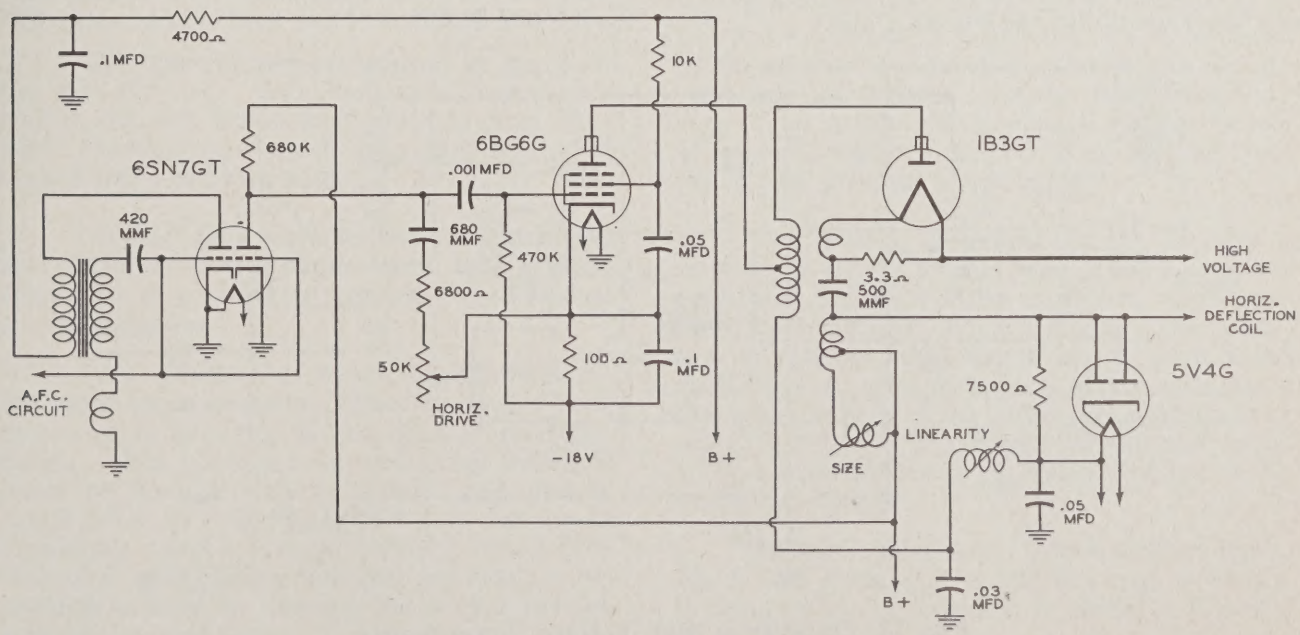


Fig. 34. Horizontal Flyback High Voltage System

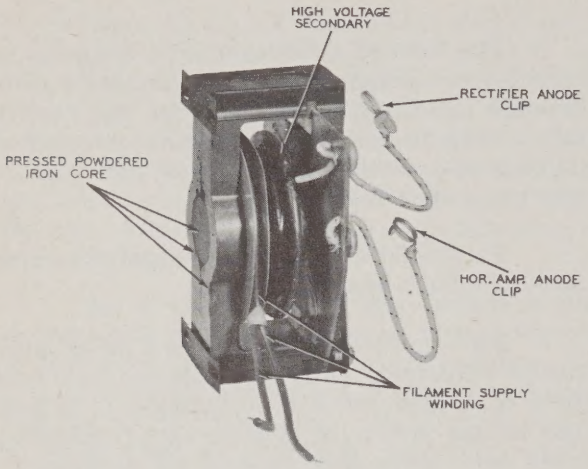


Fig. 35. Typical Horizontal Flyback Transformer (Photo from Sample Courtesy RCA)

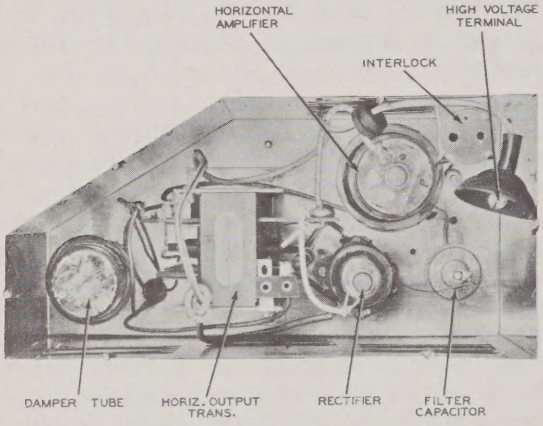


Fig. 36. Typical Horizontal Flyback High-Voltage Assembly. (Photo from Sample Courtesy Emerson Radio and Phono. Corp.)

Figure 36 is a photograph of a complete Horizontal Flyback High-Voltage System.

PULSE TYPE HIGH-VOLTAGE POWER SUPPLY: A second method has been developed for generating the high voltage during the horizontal retrace time. This system uses essentially the same type of transformer and rectifier as discussed under "Horizontal Flyback High-Voltage systems," except the transformer has no secondary deflection coil winding. It derives its pulse voltage from a blocking oscillator, which is triggered by the horizontal flyback decay. These oscillations are then amplified and fed to the primary of an auto-transformer whose output is connected to the plate of the rectifier. Voltage regulation is usually obtained by controlling the amplitude of the pulse fed to the rectifier. A typical schematic of this type system is shown in Figure 37.

In this application, a portion of the high DC voltage output is fed to the grid of half of the 6SN7, which has a type VR105 in its cathode circuit. The plate current of the 6SN7 is drawn through the 15K ohms screen-dropping resistor of the type 807 amplifier stage. A change in plate current will change the screen voltage of the 807, thus regulating the amplitude of the pulse supplied to the auto-transformer.

HORIZONTAL FLYBACK SYSTEM FOR PROJECTION TELEVISION USING VOLTAGE TRIPLERS: In the systems previously described, a single rectifier tube was employed to obtain voltages ranging up to 10,000 volts. Projection tubes require potentials of between 25,000 and 30,000 volts, and such voltages

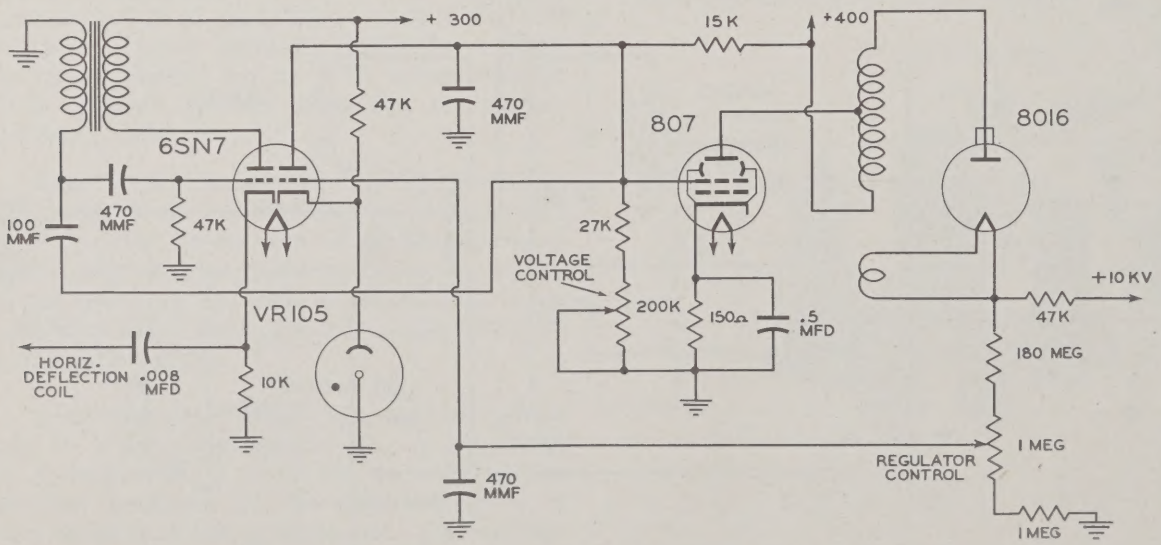


Fig. 37. Pulse Type High-Voltage Power Supply

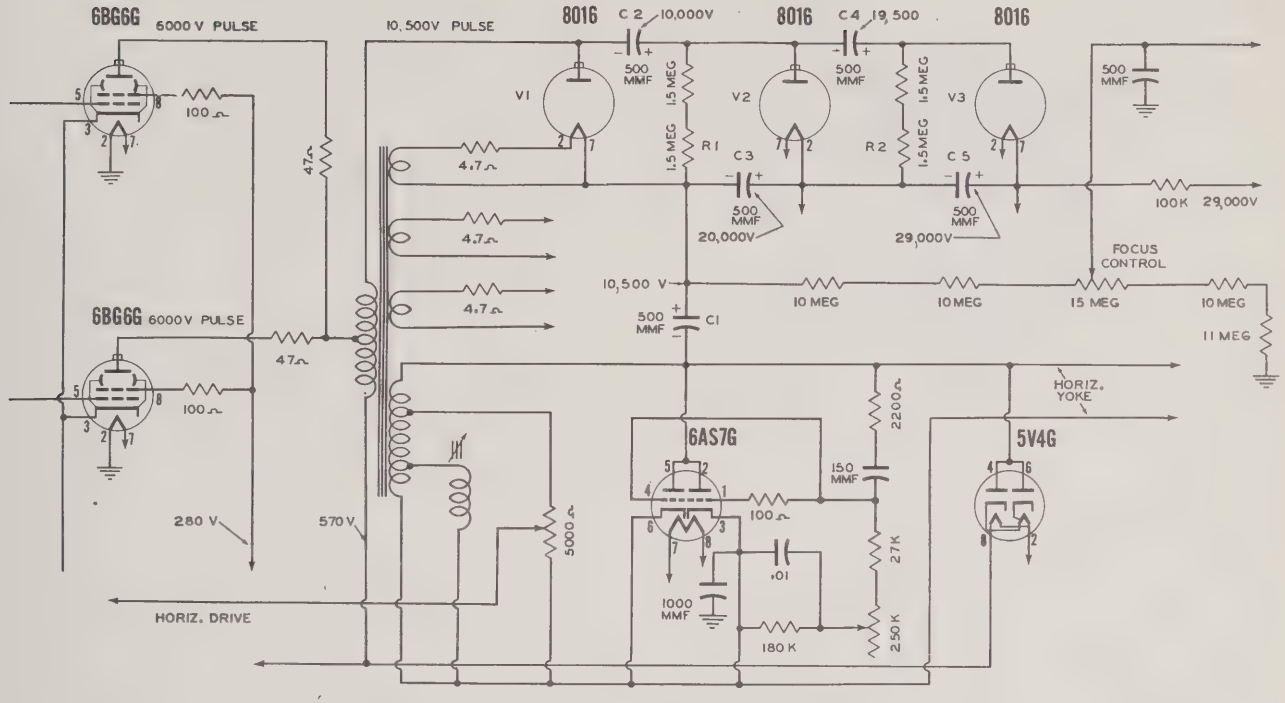


Fig. 38. Horizontal Flyback High-Voltage Tripler

cannot be obtained readily by single rectifiers due to limitations of the tubes themselves. To overcome this difficulty the power supply systems for projection tubes employ a principle of voltage multiplication in which a number of capacitors are individually charged to the peak voltage of the system through respective rectifier tubes associated with the capacitor.

Figure 38 shows a power supply of this type.

The transformer is similar in design to the one already described and illustrated in Figure 35, but differs in that it has three filament windings for three individual type 8016 high-voltage rectifier tubes.

Another difference in this system is the use of two horizontal output tubes, type 6BG6G, connected in parallel to provide the additional energy required.

The diagram shows a "ladder" arrangement of rectifier tubes, condensers and resistors to accomplish this voltage multiplication. This circuit is somewhat different from the familiar "common line" type of voltage doubler or tripler, in that the individual capacitors need a voltage rating no greater than the peak supply voltage, whereas, in the familiar multiplier circuits, the voltage ratings increase in each stage.

The voltages shown on the diagram are measured from ground. The operation of the circuit is as follows:

A pulse produced across the primary of the transformer is applied to tube V1, and the rectified current of this tube charges capacitor C1 to approximately peak value of the pulse. In the interval between pulses, capacitor C1 discharges into capacitor C2 through resistor R1. Since rectifier tube V2 is conductive in the proper direction, capacitor C3 is charged by capacitor C2. Capacitor C3 can then charge capacitor C4 through resistor R2. The final step of the multiplication consists of the charge of capacitor C5 through rectifier tube V3 from the charge existing in C4.

This series of events will require a number of cycles of operation of the horizontal oscillator for each of the capacitors to assume their final charges. When a steady state condition is reached, the charge across each of the capacitors in this group will be approximately the peak voltage of the supply system. Capacitors C1, C3 and C5 in series provide the output voltage used for the accelerating voltage of the projection tube.

Another pulse-type high-voltage supply, which was developed in Holland and recently introduced in this country, is shown in Figures 39 and 40.

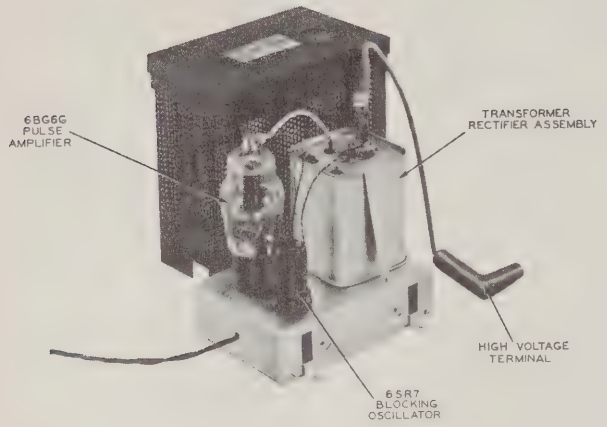


Fig. 39. Pulse Type High-Voltage System. (Hallicrafters-Norelco) Photo Courtesy North American Phillips Company, Inc.

It is an entirely self-contained unit measuring 8-1/2x7x4-1/2 inches, which can be mounted adjacent to the projection tube and supplied with heater and plate voltages from the television chassis by a three-lead cable.

While a total of five vacuum tubes is used in this system, only two of the tubes can be seen upon removal of the perforated cover. The other three tubes are specially designed, minature-size rectifiers and are hidden from view in the sealed, oil-filled, transformer assembly. The circuit components comprising the assembly are shown enclosed by dotted lines in the schematic diagram Figure 41. The photograph in Figure 40 shows this unit with the can removed.

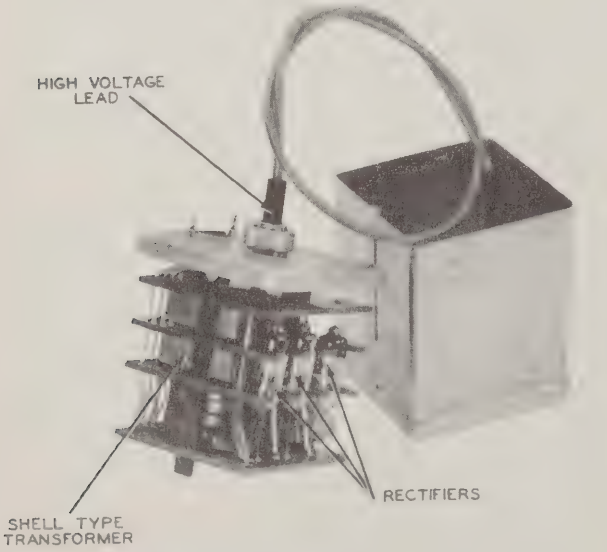


Fig. 40. Transformer-Rectifier Assembly with cover removed. (Hallicrafters-Norelco) Photo Courtesy of The Hallicrafters Company

The circuit shown in Figure 41 comprises a blocking-type oscillator employing the triode section of a 6SR7 to produce a "sawtooth" voltage whose frequency is approximately 1000 cycles per second. This waveform, represented by Vg in Figure 42, is coupled to the grid of the 6BG6G power amplifier, which is biased beyond cutoff by a combination of cathode self bias and an additional voltage from an automatic regulating circuit to be described later. Plate current, Ip in Figure 42, in the 6BG6G tube flows only for a short portion of the positive peak of the sawtooth wave applied to the grid. This positive excitation is made sufficiently great to cause plate current pulses almost equal to the maximum emission of the tube. These pulses of plate current flow through part of the primary of an iron-core transformer. The current in the transformer is represented by iL in Figure 42. Note that the current waveform across the transformer at the time of conduction of the 6BG6G contains no oscillatory component. However, when the tube is cut off, the field generated by the plate current in the transformer collapses. Since the tube is now cut off, there is no heavy damping, due to plate current flow, and the coil will start oscillating at its natural resonant frequency. This resonant frequency is governed by the inductance in the transformer and the distributed capacity in the transformer and associated circuits. The resonant frequency of this particular supply is approximately 30KC. These 30KC oscillations, shown in the iL waveform of Figure 42, will continue oscillating until plate current is drawn through the winding. This heavy current flow completely damps out the oscillations and another cycle is started. Note that at the time the oscillatory circuit is free running, the oscillations are damped. This is due to the loading of the rectifier filament windings and the losses in the transformer.

The voltage is stepped up by auto-transformer action and applied to the rectifiers. The waveform of this voltage is shown in Vo of Figure 42. Since the high voltage is additive to the B+ supply, represented by Vb, Vmax. is equal to the peak voltage plus Vb.

The first positive oscillation peaks, which are approximately 8,500 volts, charge the capacitor C1, through V1, to peak voltage. When the oscillation peaks are negative, the voltage across C1 (negative on the lower plate) is

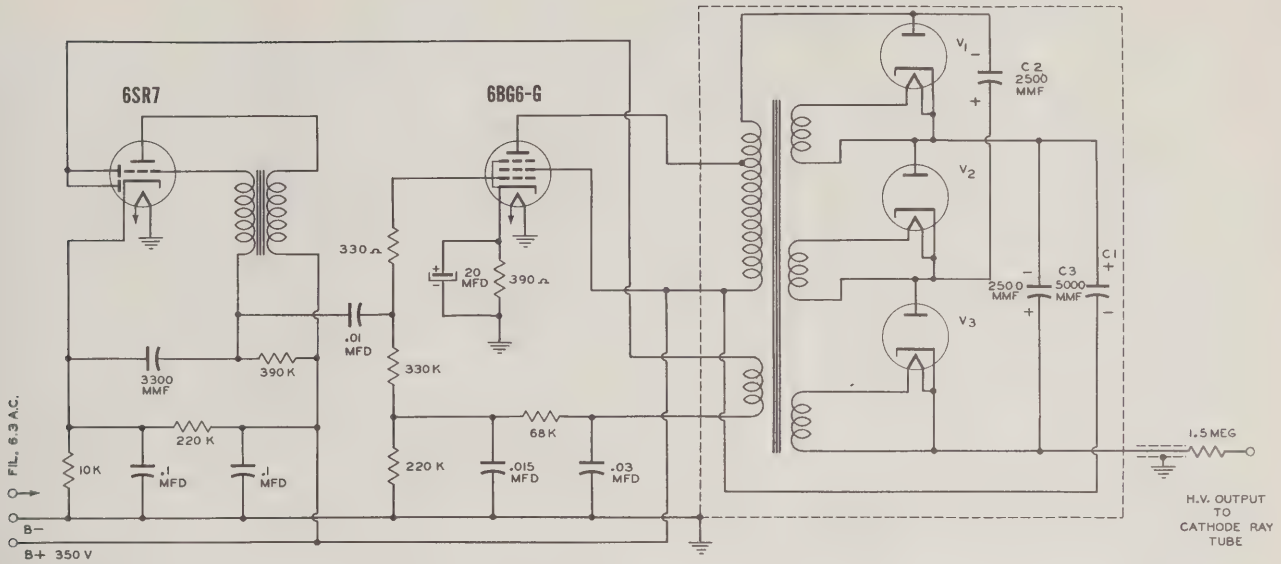


Fig. 41. Schematic Diagram of Hallicrafters-Norelco High Voltage Power Supply

additive to the peak voltage of the source, and C2 is charged to two times the peak voltage through V2. On the next positive peaks, the conductive path will be through C1, the source, C2 and V3. Since the voltage across C1 is equal to the source and of opposite polarity, C3 will charge to a peak voltage equal to that of C2. It can now be seen that voltage across C1, which is peak voltage, and the voltage across C3, which is two times peak voltage, are of the correct polarity to be additive and result in an output equal to three times peak voltage.

The additional feedback winding, mentioned previously, provides an ingenious method of improving the voltage regulation of the system. Normally, a power supply system is improved in regulation by reducing its internal resistance and providing more storage of energy by increasing the capacity of the filter capacitors. Both of these expedients tend to increase size, weight, and cost, and in a high-voltage system has the additional disadvantage of making the device more dangerous from the standpoint of electrical shock.

The voltage from this fourth winding is fed back to the diode plates of the 6SR7 blocking oscillator tube. The rectified current from these diodes passes through a filter network and is added to the bias of the 6BG6G amplifier tube. Thus, when the voltage of the system tends to drop due to greater output load, the bias of the amplifier tube is made less negative and the duration of the pulse is increased. This tends to increase the output.

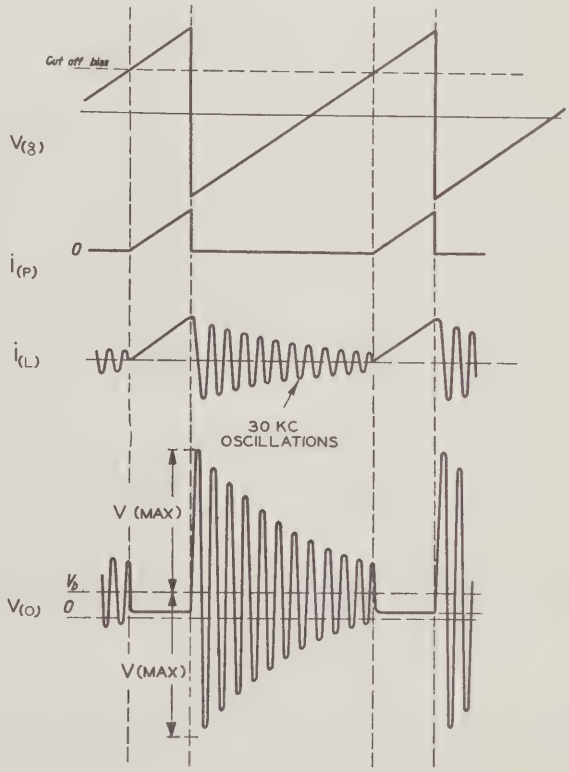


Fig. 42. Voltage and Current Waveforms - Pulse Type Power Supply

With constant input supply voltages to this power pack, the output voltage is 25,500 volts plus or minus 2,000 volts at no load, and drops less than 600 volts at a load of 60 microamperes and less than 1,200 volts at a load of 125 microamperes.

CHAPTER 2

CATHODE-RAY - - BEAM DEFLECTION SYSTEMS

RC CIRCUITS

The elements in a cathode-ray or picture tube provide an emitter or source of electrons, a means of forming an electron beam and accelerating its speed, and a phosphor surfaced screen which will flouresce or glow when bombarded by the stream of electrons. They also provide for the movement of the beam horizontally and vertically to form a frame of light, or raster, on the face of the picture tube.

The voltage or current waveforms which are required for deflecting the electron beam are obtained from sweep generators which are followed by special wave-shaping circuits. The sweep generators are triggered by the synchronizing pulses which are clipped from the transmitted signal. This makes possible the synchronization of the sweep circuits in the receiver with those of the transmitter. The formation of certain waveshapes is required in order to obtain a linear sweep. This waveshape may be a sawtooth, as is required for electrostatic deflection, or a more complex voltage waveform used to obtain a sawtooth current flow in magnetic deflection coils. Some circuits are designed to pass a waveform with a minimum of distortion, while others are designed to effect great distortion when generating, amplifying, or passing a waveform. The behavior of these distortion circuits can best be understood by studying a charging or discharging capacitor in series with a resistor.

It is elemental in radio theory that when electrons flow through a resistor, a voltage or IR drop is developed across that resistor.

The value of voltage developed by a current flowing through a resistance is found by applying Ohm's law:

$$E = I \times R$$

where E is in volts, I in amperes, and R in ohms.

A further study of fundamentals reveals that a capacitor is capable of storing or holding a charge of electrons. When charged, one plate contains more free electrons than the opposite plate; when the capacitor is completely discharged, both plates contain the same number of free electrons. The difference in number of electrons is a measure of the charge that exists across the capacitor. When the accumulation of electrons on one plate exceeds the accumulation on the other plate, a potential difference exists across the terminals of the capacitor, and this potential will continue to increase until it equals, for practical purposes, the applied or charging voltage. The value of voltage developed by a charging capacitor is computed by applying the following equation:

$$E = \frac{Q}{C}$$

where Q is in coulombs, C in farads, and E in volts. One coulomb is the quantity of electrical charge transferred if one ampere flows for one second.

R-C CIRCUIT CHARGING: A capacitance and a resistance employed in a voltage divider circuit, as shown in Figure 43, develop a pressure or potential across their respective terminals. This circuit is commonly known as an R-C circuit, to which both Kirchoff's and Ohm's laws apply. Referring to the graphs and diagram in Figure 43, the voltage divider AB of the circuit diagram is shown in various time positions on the graph after closing the switch. As time progresses, the voltage Ec on the capacitor gradually increases, while the voltage developed across the resistor Er gradually decreases.

When the switch is closed, electrons are displaced from the upper plate of the capacitor, thus developing a positive charge causing electrons to be attracted to the lower plate through

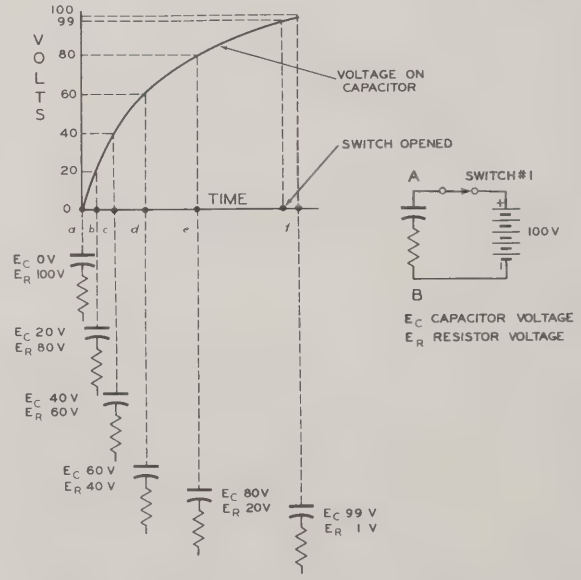


Fig. 43. Resistor-Capacitor Charging Curve

the resistor. This flow of electrons is the current that charges the capacitor. At the instant the current begins to flow, no charge is present on the capacitor, as seen at point "a" on the graph; therefore, the applied voltage E across the divider must all appear as a voltage drop across the resistor. The initial charge current, therefore, must be equal to $\frac{E}{R}$.

In recalling Kirchoff's law, it states that the sum of the voltages in a closed circuit is equal to zero. Likewise, the sum of the voltage drops in a closed circuit must equal the applied voltage. Therefore, if 100 volts is applied to an R-C circuit, this entire voltage appears across the resistor at the time the switch closes. The graph shows that at the instant the switch is closed, the entire applied voltage appears across R, while the voltage across C is zero.

However, the current flowing in the circuit soon charges the capacitor a small amount, and a voltage will appear across this capacitor. See position "b" of the voltage divider plotted on the graph. Note: Ec is now 20 volts and Er is 80 volts, the sum of the two being equal to the applied voltage. As time elapses, Ec becomes greater and Er smaller, as will be noted at the time points "b", "c", "d", "e", and "f". Actually, the capacitor voltage becomes a re-active voltage, or back pressure (opposite in polarity and opposed to the applied potential). This causes the charging current to decrease and the IR drop across the resistance to fall, resulting in the capacitor charging at a slower rate.

This charging action continues until the capacitor is almost fully charged. At this time, the voltage across R must be near zero, and the charging current is practically zero. Theoretically, a capacitor never fully charges, and some minute voltage will always appear across the resistor. However, if the switch is closed long enough, an almost steady state condition is reached and the capacitor is considered fully charged for all practical purposes.

Charging a capacitor electrically can be likened to inflating a flat tire where a current of air first rushes into the inner tube and gradually tapers off as the tire becomes inflated. The current of air flowing into the tire from the compressor sometimes rings a bell. At first the bell rings in rapid succession, but gradually slows up as the tire builds up a back pressure.

R-C CIRCUIT DISCHARGE: Suppose that, just before point "f" on the charging curve, the

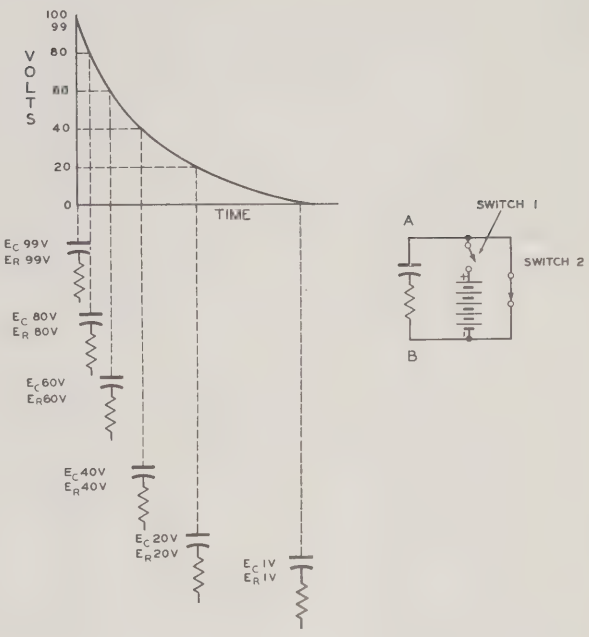


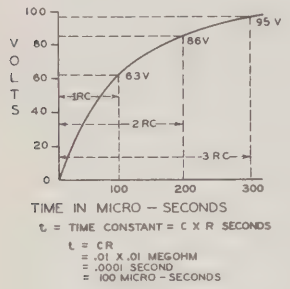
Fig. 44. Resistor-Capacitor Discharging Curve

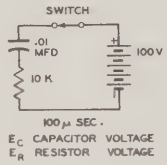
charging switch is thrown open and the discharging switch closed, as shown in Figure 44.

Note that the capacitor voltage reached a value of 99 volts. This value would have been slightly higher if the charging circuit had been left closed for a longer period of time. In Figure 44, the battery switch is open and a short circuit path is switched across the divider. The 99 volts of potential energy stored by the capacitor now becomes an applied voltage of the discharge circuit and will cause a current to flow around the circuit. The discharge current will be opposite in direction to the charging current, developing an IR drop across the resistor. The voltage drop across the resistor, due to the discharge current, will be opposite in polarity to that developed by the charging current. The discharge curve will vary exponentially in exactly the same manner as the charge curve, but will be diminishing in value.

During discharge, the capacitor voltage is shown dropping from its initial value, and, representing the applied voltage of the discharge circuit, will be equal to the voltage drop across the resistor (Kirchoff's Law). Seeing that the capacitor voltage now represents the applied voltage of the discharge circuit, Ec and Er will slowly approach zero together. (The plotted charging curve is not linear throughout. However, the initial charge portion of the curve, Figure 43, is practically straight up to 40 volts, and it is this portion of the surve that we will be more concerned with in television

sweep circuits because of this linearity. This is the most important point of the discussion and should be borne in mind for future reference.) Also note that the capacitor voltage does not reverse in polarity during the charge and discharge cycle. This is not true in the case of the resistor voltage because the current actually reverses its direction between the charge and discharge period.





1 RC	100 μ SEC
2 RC	200 μ SEC
3 RC	300 μ SEC
4 RC	400 μ SEC
5 RC	500 μ SEC

TIME	E_C	E_R
1 RC	63 V	37 V
2 RC	86 V	14 V
3 RC	95 V	5 V
4 RC	98 V	2 V
5 RC	99 V	1 V

Fig. 45. R-C Time Constants

TIME CONSTANTS OF AN R-C CIRCUIT: The diagram in Figure 45 shows an R-C circuit connected across an applied voltage. The time required to charge the capacitor to 63.2% of the applied voltage is known as the time constant of the circuit. The value of this time constant in seconds is equal to the product of the circuit resistance in ohms and the capacity in farads, and may be found by using any of the following relations:

1. R (in ohms) x C (in farads) = t (in seconds)
2. R (in megohms) x C (in microfarads) = t (in seconds)
3. R (in ohms) x C (in microfarads) = t (in microseconds)
4. R (in megohms) x C (in micro-microfarads) =t (in microseconds)

EXAMPLE: A 0.1 microfarad capacitor in series with a 100K ohm resistor will take .01 of a second or 10,000 microseconds to reach 63.2% of the applied voltage.

Referring to Figure 45, a .01 mfd. capacitor is in series with a 10K ohm (.01 megohm) resistor.

Now, we find from the above table that multiplying microfarads by megohms will give an R-C time constant of .0001 seconds or 100 microseconds for this circuit.

Therefore, we interpret from the time constant that when 100 microseconds has elapsed since switching on, 63.2% of the applied voltage is across the capacitor and 36.8% across the resistor.

The applied voltage being 100 volts, the capacitor charge will be approximately 63 volts and the IR drop across the resistance, due to the charging current, will be approximately 37 volts.

In twice the R-C time, or 200 microseconds, 63.2% of the remaining 37 volts is added to the original 63.2% charge, making approximately 86 volts across the capacitor and 14 volts drop across the resistor.

200 microseconds = 2RC = 63 volts + (63.2% x 37) = 86.4 volts. This value may be found by following the Ec curve in Figure 45.

Theoretically, the capacitor never reaches a fully charged condition; but at the completion of 5 R-C seconds, approximately 99% displacement of voltage across the circuit has occurred and for all practical purposes, this is sufficient to be considered as full charge. Refer to chart in Figure 45.

DISCHARGE: The time required to discharge a capacitor is the same as that required in charging. Therefore, the time constant (R-C) is proportional to the time required to charge or discharge a capacitor.

In 1 R-C time of the discharge period, 36.8% of the original charge will remain in the capacitor. The charge and discharge curves are shown in Figure 46. Note the similarity; exponentially they are the same.

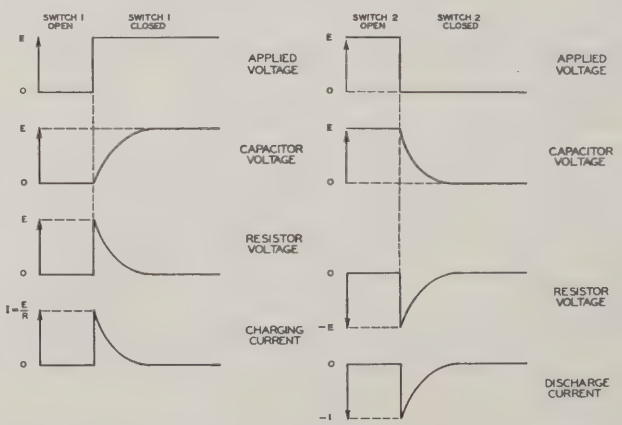
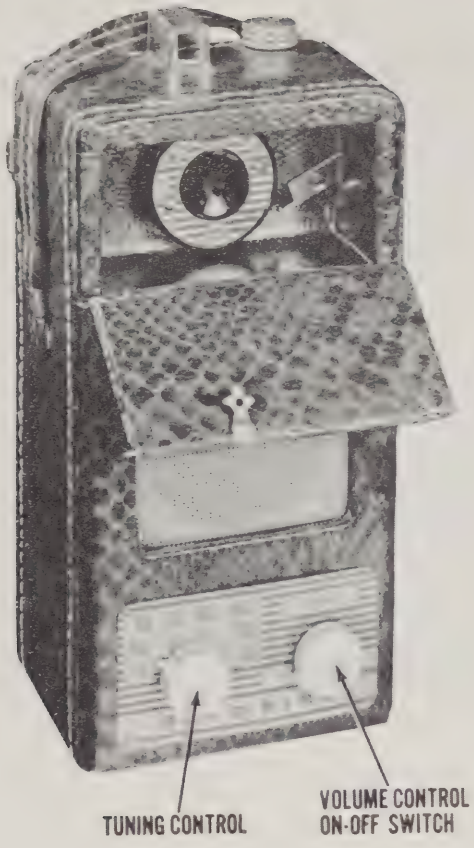


Fig. 46. R-C Charge and Discharge Curves

Installment No. 4 will continue the study of R-C Time Constants, Wave Shaping Circuits, and begin the study of Blocking Oscillators and Multivibrators.

AIR KING MODEL A-410 (REVISED)
BATTERY OPERATED



AIR KING MODEL A-410 (REVISED)
BATTERY OPERATED

AIR KING MODEL A-410 (REVISED)

TRADE NAME	Air King, Model A-410 (Revised)
MANUFACTURER	Air King Products Co., 170 53rd St., Brooklyn, N.Y.
TYPE SET	Battery Operated Portable Superheterodyne Receiver with Camera
TUBES (FOUR)	Types, 1R5 Converter, 1T4 IF Amp., 1S5 Det.-AVC-AF, 3Q4 Power Output
POWER SUPPLY	1.5 Volts "A" Supply and 67.5 Volts "B" Supply
RATING	250MA @ 1.5 Volts DC and 10MA @ 67.5 Volts DC
TUNING RANGE—BROADCAST	540-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to large stator of tuning cap. Low side to chassis.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output.
2		Loop	1600KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	1400KC	Tune for maximum output.	"	A6	Adjust for maximum output.

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

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PARTS LIST AND DESCRIPTIONS

AIR KING MODEL A-410 (REVISED)

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		AIR KING PART No.	STANDARD REPLACEMENT		
1	Converter	1R5	1R5	7AT	
2	IF Amp.	1T4	1T4	6AR	
3	Det.-AVC-AF	1S5	1S5	6AU	
4	Power Output	3V4	3V4	6BX	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	AIR KING PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
5	8	100		PRS150/8	BR815	M-8-150		Filter
6	.005	600		684-005	DT6D5	ST-6-005	TC-25	Output Plate Bypass
7	.005	150		684-005	DT6D5	ST-6-005	TC-25	Audio Coupling
8	.01	400		484-01	DT4S1	ST-4-01	TC-11	Screen Bypass
9	.01	400		484-01	DT4S1	ST-4-01	TC-11	AVC Filter
10	220	500		1468-0002	5W5T2	MO.5-32	1FM-32	AF Plate Bypass
11	1000	300		1468-001	1W5D1	MO.3-21	1FM-21	Audio Coupling
12	100	500		1468-0001	5W5T1	MO.5-31	1FM-31	Diode RF Filter

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	AIR KING PART No.	IRC PART No.	CLAROSTAT PART No.	
13A	2 Meg.	½	24c8	D13-139	AM-66-Z	Volume Control
B	Shaft		Not Req.	E	KSS-3	Attach to 13A per instructions
C	Switch		" "	42	SW-A2	" " " " "

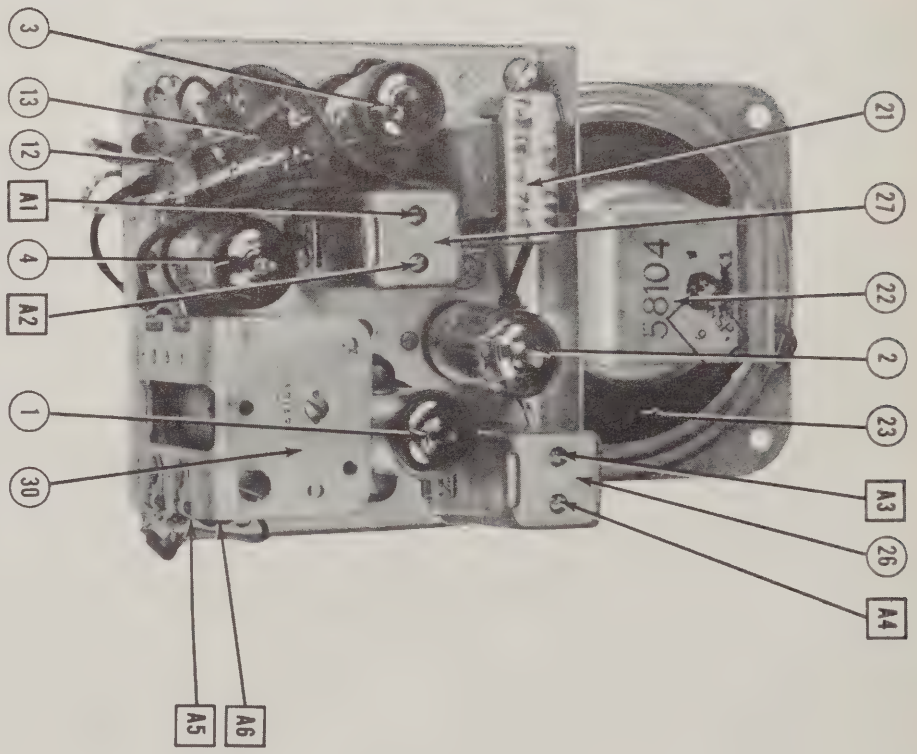
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	AIR KING PART No.	IRC PART No.	
14	100KΩ	½		BTS-100K	Br.-Blk.-Grn. Osc. Grid
15	3 Meg.	½		BTS-3 Meg.	Or.-Blk.-Grn. AVC Network
16	10 Meg.	½		BTS-10 Meg.	Br.-Blk.-Grn. AF Grid
17	3 Meg.	½		BTS-3 Meg.	Or.-Blk.-Grn. AF Screen Dropping
18	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. AF Plate Load
19	2 Meg.	½		BTS-2 Meg.	Red-Blk.-Grn. Output Grid
20	470Ω	½		BTS-470	Yl.-Vl.-Br. Bias

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		AIR KING PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
21	8000Ω	3.6Ω	630Ω	.8Ω	1342			A-2998*	*Remove frame from original and use with replacement.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: AIR KING PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	VC IMP.				
22	PM	3.6Ω	58104		3A07#	#Fabricate new mounting bracket.
	CONE DIA.	VC DIA.				
23	3-3/8"	1/2"				

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA: AIR KING PART No.	MEISSNER PART No.	
		PRI.	SEC.			
24	Loop Ant.		3Ω	28218		
25	Osc. Coil	2.1Ω	9.1Ω	28217		
26	Input IF	20.2Ω	19.4Ω	3379		
27	Output IF	20.2Ω	19.4Ω	3379		

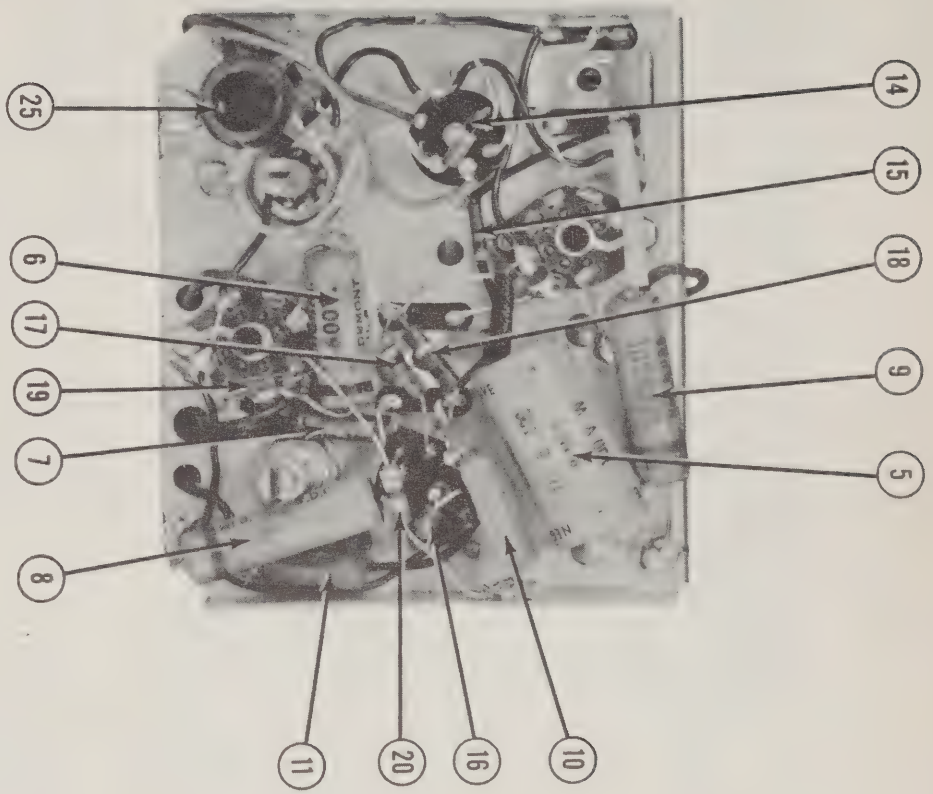
BATTERIES

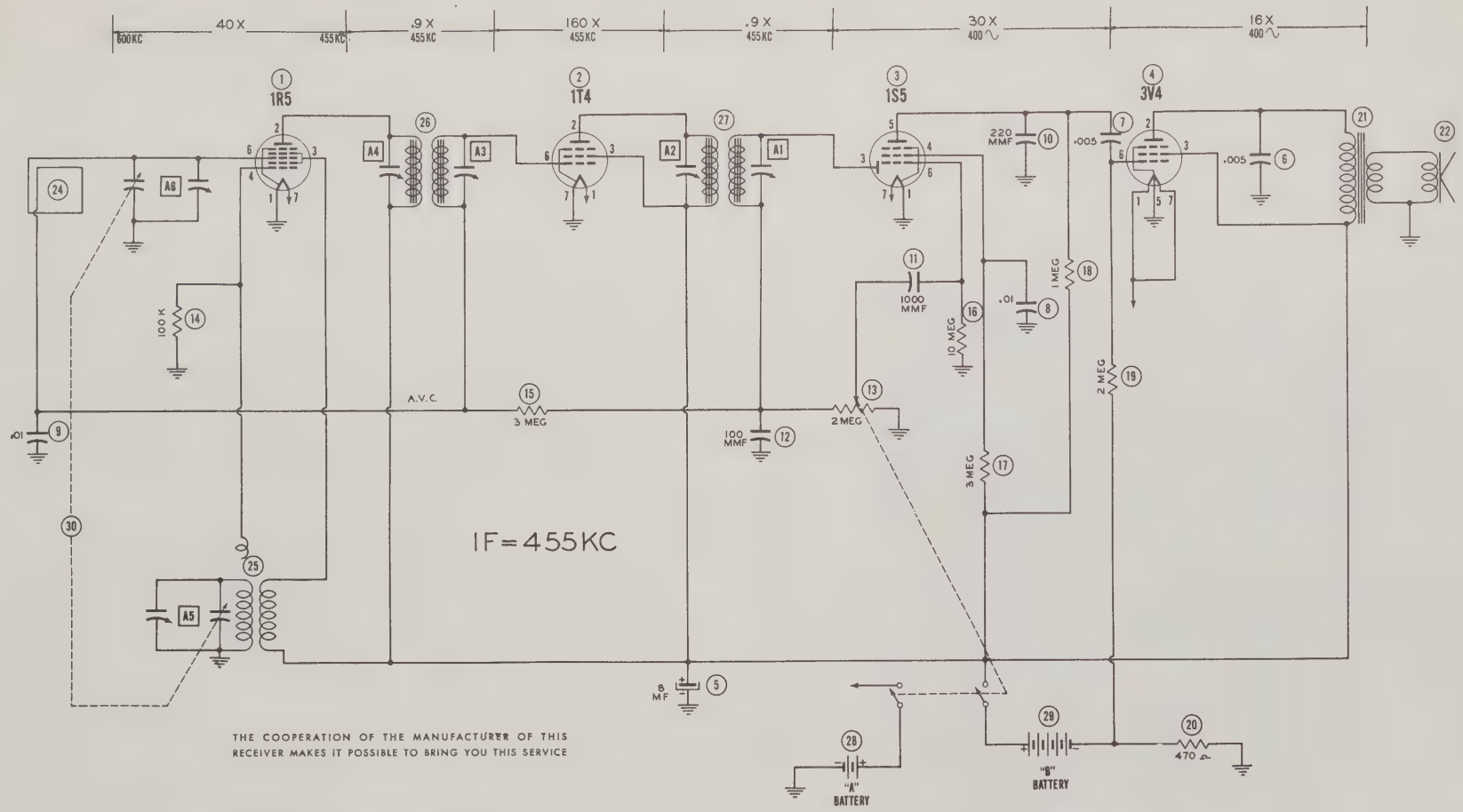
ITEM No.	VOLTAGE	AIR KING PART No.	REPLACEMENT DATA: EVEREADY "A"	EVEREADY "B"	EVEREADY "A-B"	BURGESS "A"	BURGESS "B"	BURGESS "A-B"	INSTALLATION NOTES
28	1.5V "A"		950			2R			2 Used in Parallel
29	67.5V "B"			467			XX45		

MISCELLANEOUS

ITEM No.	PART NAME	AIR KING PART No.	NOTES
30	2 Gang Var. Cap.	40136	(14-277 MMF, 20-138MMF)

CHASSIS—BOTTOM VIEW





THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1R5	0V.	62VDC	62VDC	-2VDC§	0V.	0V.	1.4VDC
2	1T4	0V.	62VDC	62VDC	0V.	0V.	0V.	1.4VDC
3	1S5	0V.	0V.	-.2VDC	14.5VDC	7.5VDC	0V.	1.4VDC
4	3V4	1.4VDC	62VDC	62VDC	-5.2VDC	0V.	-.8VDC	1.4VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1R5	*	500KΩ	500KΩ	100KΩ	*	5 Meg.	*
2	1T4	*	500KΩ	500KΩ	INF.	*	5 Meg.	*
3	1S5	*	INF.	2 Meg.	3.5 Meg.	1.5 Meg.	10 Meg.	*
4	3V4	*	500KΩ	500KΩ	470Ω	*	2 Meg.	*

*DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE. RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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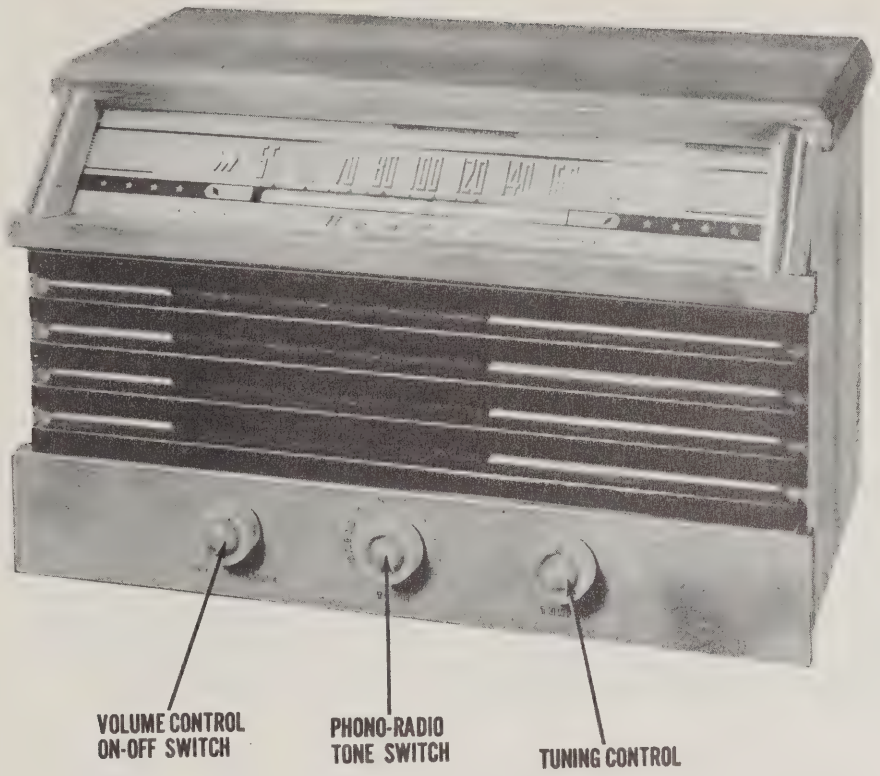
4810-1

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by shorting AVC line to chassis.

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
5 - Volume control at maximum, no signal applied for voltage measurements.

BENDIX MODELS, 300
300W, 301, 302



BENDIX MODELS, 300
300W, 301, 302

BENDIX MODEL 301

TRADE NAME	Bendix, Models 300, 300W, 301, 302
MANUFACTURER	Bendix Radio, Div. of Bendix Aviation Corp., Baltimore, Md.
TYPE SET	AC-DC Operated Superheterodyne Receiver with Loop Antenna
TUBES (SIX)	Types, 14A7 RF Amp., 14Q7 Converter, 14A7 IF Amp., 14B6 Det.-AVC-AF, 35A5 Power Output, 35Y4 Rectifier.
POWER SUPPLY	105-125 Volts AC-DC
TUNING RANGE—BROADCAST	540-1620KC RATING .25 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer 2¼" from left edge of dial backplate. This is the calibration mark referred to below.

Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to ext. antenna terminal. Low side to B-.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If isolation transformer is not not used reduce dummy ant. to .001 MFD to reduce hum modulation.
2	50 MMFD	"	1475KC	4-9/16" from calibration mark.	"	A5	Adjust for maximum output.
3	50 MMFD	"	"	Tune for maximum output.	"	A6,A7	" " " "
4	50 MMFD	"	965KC	2-13/16" from calibration mark.	"		If dial calibration is not within ± 10KC bend tuning cap. rotor plates to correct calibration.
5	50 MMFD	"	580KC	9/16" from calibration mark.	"		If dial calibration is not within ± 10KC bend tuning cap. rotor plates to correct calibration. Repeat Steps 2, 3, 4 and 5 until no further improvement can be made.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: BENDIX PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	14A7	14A7	8V	
2	Converter	14Q7	14Q7	8AL	
3	IF Amp.	14A7	14A7	8V	
4	Det.-AVC-AF	14B6	14B6	8W	
5	Power Output	35A5	35A5	6AA	
6	Rectifier	35Y4	35Y4	5AL	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: BENDIX PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
7A	40	150	CE3A00	AF844D†	UP64215	DY-604020-150	EL-224‡	▲ Filter
B	60	150						■ "
C	20	150		PRS150/40			UT-401	"
8	.05	400	CP4T40	484-05	DT4S5	ST-4-05	TC-15	Line Filter
9	.02	400	CP4T34	484-02	DT4S2	ST-4-02	TC-12	Output Plate Bypass
10	.04	400	CP4T38	484-04	DT4S4	ST-4-04	TC-14	Tone Compensation
11	.01	400	CP4T31	484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
12	.006	400	CP4T20	484-006	DT6D6	ST-6-006	TC-26	" "
13	.1	400	CP4T51	484-.1	DT4P1	ST-4-1	TC-1	Phono Isolation
14	.1	400	CP4T51	484-.1	DT4P1	ST-4-1	72P2	Line Isolation
15	.05	400	CP4T40	484-05	DT4S5	ST-4-05	TC-15	IF Cathode Bypass
16	.05	400	CP4T40	484-05	DT4S5	ST-4-05	TC-15	AVC Filter
17	.004	600	CP6T16	684-004	DT6D4	ST-6-004	TC-24	Ext. Ant. Isolation
18	330	500	CC8F40	1468-00035	5W5T4	MO.5-34	1FM-335	Tone Comp.
19	220	500	CM5A30	1468-00025	5W5T25	MO.5-325	1FM-325	AF Plate Bypass
20	47	500	CM5A14	1468-00005	5W5Q5	MO.5-45	1FM-45	Osc. Grid Cap.
21	47	500	CM5A14	1468-00005	5W5Q5	MO.5-45	1FM-45	Fixed Trimmer

†Parallel sections to obtain desired capacity.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: BENDIX PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
22A	1 Meg.	½	RV4S03	D13-137	M-63-Z	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 22A per instructions
C	Switch		" "	41	SW-A	" " " " "

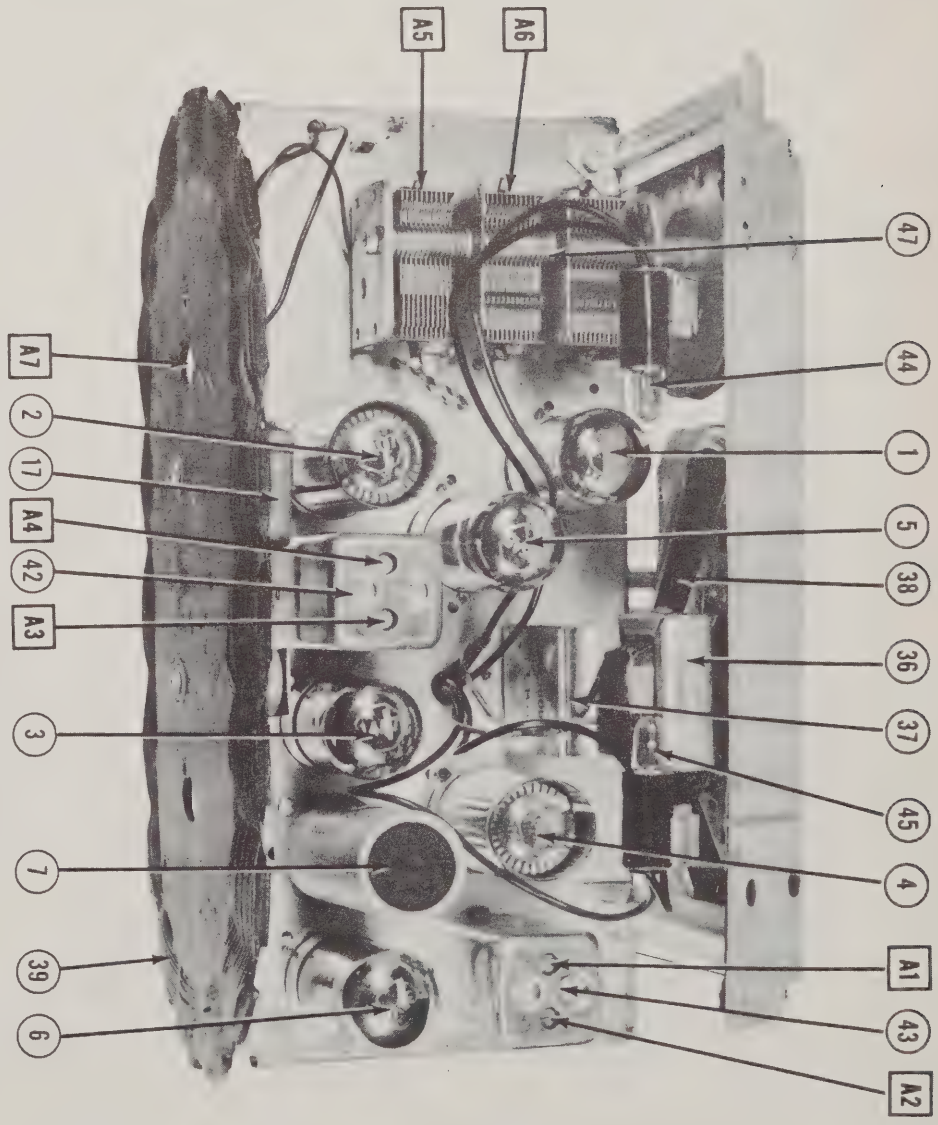
RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: BENDIX PART No.	IRC PART No.	IDENTIFICATION CODES
23	220Ω	½	RC1H16	BW-½-220	Red-Red-Br. RF Cathode
24	22KΩ	½	RC1H40	BTS-22K	Red-Red-Or. Osc. Grid
25	3.3 Meg.	½	RC1H68	BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
26	1500Ω	½	RC1H26	BTS-1500	Br.-Grn.-Red IF Cathode
27	220KΩ	½	RC1H54	BTS-220K	Red-Red-Yl. AF Plate Load
28	4.7 Meg.	½	RC1H70	BTS-4.7 Meg.	Yl.-Vi.-Grn. AF Grid
29	1 Meg.	½	RC1H62	BTS-1 Meg.	Br.-Blk.-Grn. Tone Compensation
30	470KΩ	½	RC1H58	BTS-470K	Yl.-Vi.-Yl. Output Grid
31	150Ω	1	RW1B28	BW-1-150	Br.-Grn.-Br. Output Cathode
32	1200Ω	1	RC3H26	BTA-1200	Br.-Red-Red Filter
33	220Ω	2		BW-2-220	Red-Red-Br. "
34	47Ω	1	RW2S07	BW-1-47	Yl.-Vi.-Blk. Line Dropping
35	220KΩ	½	RC1H54	BTS-220K	Red-Red-Yl. Line Isolation

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: BENDIX PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	INSTALLATION NOTES
36	2300Ω	3.1Ω	170Ω	.4Ω	CH2S006-2	A-3878‡	T22S45‡	A-2923‡	‡Bend mounting tabs down, file out slots and mount on original brackets.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			BENDIX PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	VC IMP.				
37	PM	3.1Ω	LH-256001		46A15*	*Fabricate new mounting bracket.
	CONE DIA.	VC DIA.				
38	4"x6"	1/2"				

R F COILS

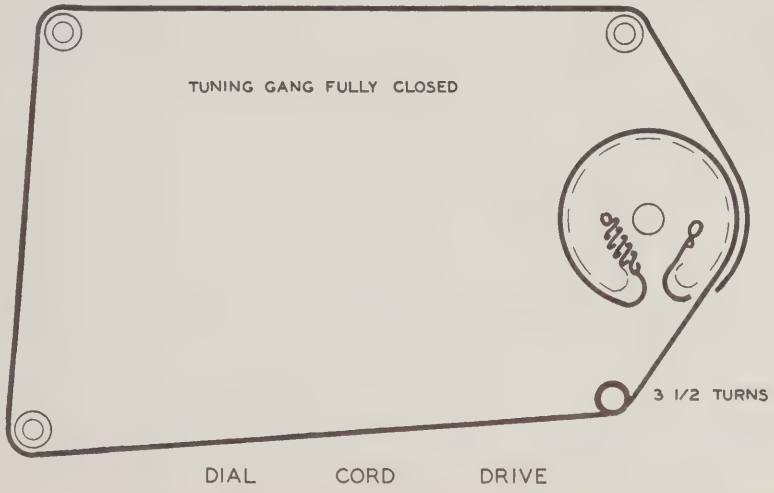
ITEM No.	USE	DC RES.		REPLACEMENT DATA	
		PRI.	SEC.	BENDIX PART No.	MEISSNER PART No.
39	Ant. Loop		.5Ω	AL0C06	
40	RF Coil	3Ω	6Ω	TR6L00	14-1027
41	Osc. Coil	.5Ω	4.5Ω	LO5B01	14-1060
42	Input IF	20.5Ω	20.5Ω	T10C01	16-6658
43	Output IF	21.0Ω		TA001	16-6670

DIAL LIGHT

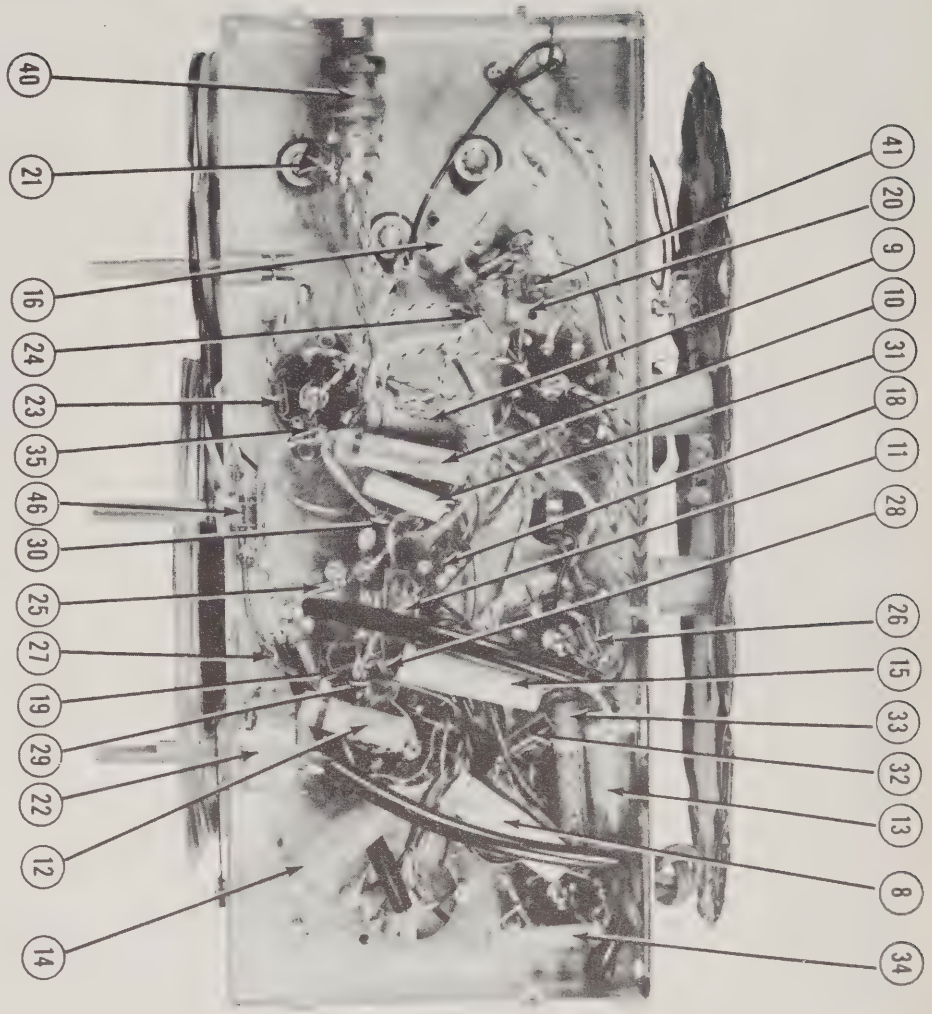
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					BENDIX PART No.		
44	Bayonet	6-8	0.15	Brown	#47		Type 47
45	"	"	"	"	"		" "

MISCELLANEOUS

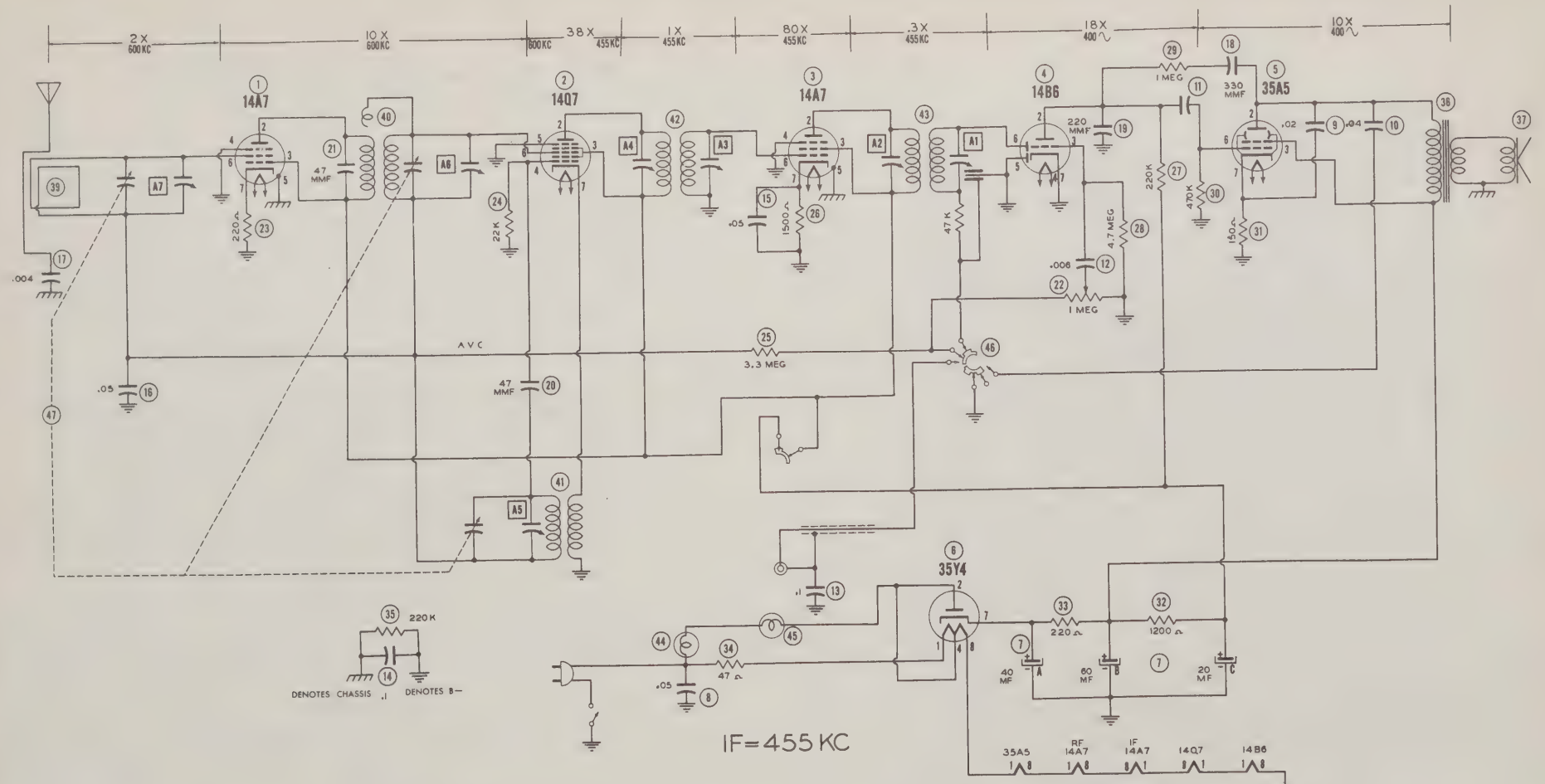
ITEM No.	PART NAME	BENDIX PART No.	NOTES
46	Switch	SR4C00	Radio-Phono-Tone
47	3 Gang Var. Cap.	CV0C04	(32-475M1F, 32-475M1F, 35-138MMF)
	Dial Pointer	ID0M15	
	Dial Scale	DS0A24	(Models 300, 300W)
	" "	DS0A26	(" 301, 302)



CHASSIS—BOTTOM VIEW



BENDIX MODELS 300, 300W, 301, 302



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	14A7	49VAC	80VDC	80VDC	0V.	0V.	0V.	1.6VDC	37VAC
2	14Q7	12VAC	80VDC	80VDC	-8VDC§	0V.	0V.	0V.	24VAC
3	14A7	24VAC	80VDC	80VDC	0V.	0V.	0V.	5.1VDC	37VAC
4	14B6	12VAC	62VDC	-.8VDC	0V.	0V.	-.8VDC	0V.	0V.
5	35A5	82VAC	97VDC	103VDC	0V.	0V.	0V.	6VDC	49VAC
6	35Y4	114VAC	110VAC	114VAC	110VAC	117VAC	117VAC	117VDC	82VAC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RADIO-PHONO SWITCH IN RADIO POSITION.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	14A7	50Ω	100KΩ	100KΩ	0Ω	0Ω	4.3 Meg.	220Ω	37Ω
2	14Q7	12Ω	100KΩ	100KΩ	22KΩ	0Ω	4.3 Meg.	.5Ω	24Ω
3	14A7	24Ω	100KΩ	100KΩ	0Ω	0Ω	20.5Ω	1.5KΩ	37Ω
4	14B6	12Ω	320KΩ	4.7 Meg.	0Ω	0Ω	1 Meg.	0Ω	0Ω
5	35A5	80Ω	100KΩ	100KΩ	0Ω	INF.	470KΩ	150Ω	50Ω
6	35Y4	115Ω	110Ω	115Ω	110Ω	120Ω	120Ω	100KΩ	80Ω

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

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4810-2

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

BENDIX MODEL
613

BENDIX MODEL 613

TRADE NAME	Bendix, Model 613
MANUFACTURER	Bendix Radio, Div. of Bendix Aviation Corp., Baltimore, Md.
TYPE SET	AC Operated Combination Phono-Radio Superheterodyne Receiver with Loop Antenna
TUBES (FIVE)	Types, 12BE6 Converter, 12BA6 IF Amp., 12AT6 Det.-AVC-AF, 50B5 Power Output, 35W4 Rectifier.
POWER SUPPLY	110-120 Volts AC
TUNING RANGE—BROADCAST	540-1620KC RATING .31 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to first reference mark at left end of dial backplate.
Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to Pin 7 (grid) of 12BE6. Low side to B-.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If isolation transformer is not used reduce dummy antenna to .001 MFD to reduce hum modulation.
2	200MMFD	High side to ext. antenna lead. Low side to B-.	1500KC	3½" from reference mark.	"	A5	Adjust for maximum output.
3	200MMFD	"	"	Tune for maximum output.	"	A6	" " " "

DISASSEMBLY INSTRUCTIONS

1. Remove four push-on type control knobs.
2. Remove four tacks holding panel over bottom of record changer. Remove panel from cabinet.
3. Disconnect phono-pickup plug.
4. Disconnect phono-motor plug.
5. Remove staples holding loop antenna in cabinet. Remove one wood screw holding antenna trimmer in cabinet.
6. Remove four screws holding chassis in cabinet. Remove chassis from cabinet.

HOWARD W. SAMS & CO., INC. **Indianapolis Indiana**

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DATE 5/48-#4810-3 SET #40-FOLDER #3

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: BENDIX PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	12BE6	12BE6	7CH	
2	IF Amp.	12BA6	12BA6	7BK	
3	Det.-AVC-AF	12AT6	12AT6	7BT	
4	Power Output	50B5	50B5	7BZ	
5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: BENDIX PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
6A	40	150	CE3E02	PRSA150/40-40	EZ555150*	DSB-2x40-150	TA-440	Filter-Red
B	40	150						" -Blue
C	40	150		PRS150/40		M-40-150	UT-401	" -Grn.
7	25	25	CE1T04	PRSA25/25	BR252A	M-25-25	TA-25	Cathode Bypass
8	.05	400	CP4T40	484-05	DT4S5	ST-4-05	TC-15	Line Filter
9	.02	400	CP4T34	484-02	DT4S2	ST-4-02	TC-12	Output Plate Bypass
10	.006	400	CP4T20	484-006	DT6D6	ST-6-006	TC-26	Tone Comp.
11	.01	400	CP4T31	484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
12	.006	400	CP4T20	484-006	DT6D6	ST-6-006	TC-26	" "
13	.01	400	CP4T31	484-01	DT4S1	ST-4-01	TC-11	Tone Comp.
14	.1	400	CP4T51	484-.1	DT4P1	ST-4-1	TC-1	Phono Isolation
15	.05	400	CP4T40	484-05	DT4S5	ST-4-05	TC-15	AVC Filter
16	.1	400	CP4T51	484-.1	DT4P1	ST-4-1	72P2	Line Isolation
17	220	500	CC6A38	1468-00025	5W5T25	MO.5-325	1FM-325	AF Plate Bypass-Cer.
18	100	300	CC6A34	1468-0001	5W5T1	MO.5-31	1FM-31	RF Bypass-Cer.
19	47	300	CC6A30	1468-00005	5W5Q5	MO.5-45	1FM-45	Osc. Grid Cap.-Cer.
20	4.7		CC9A18	1468-000005	5W5V5	MO.5-55	MS-55	Ext. Ant. Coupling-Cer.

*Omit bypass section.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: BENDIX PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
21A	500KΩ	½	RV0C02	D13-133X	T-78	Volume Control tapped @ 100KΩ
B	Shaft		Not Req.	A	Not Req.	Attach to 21A per instructions

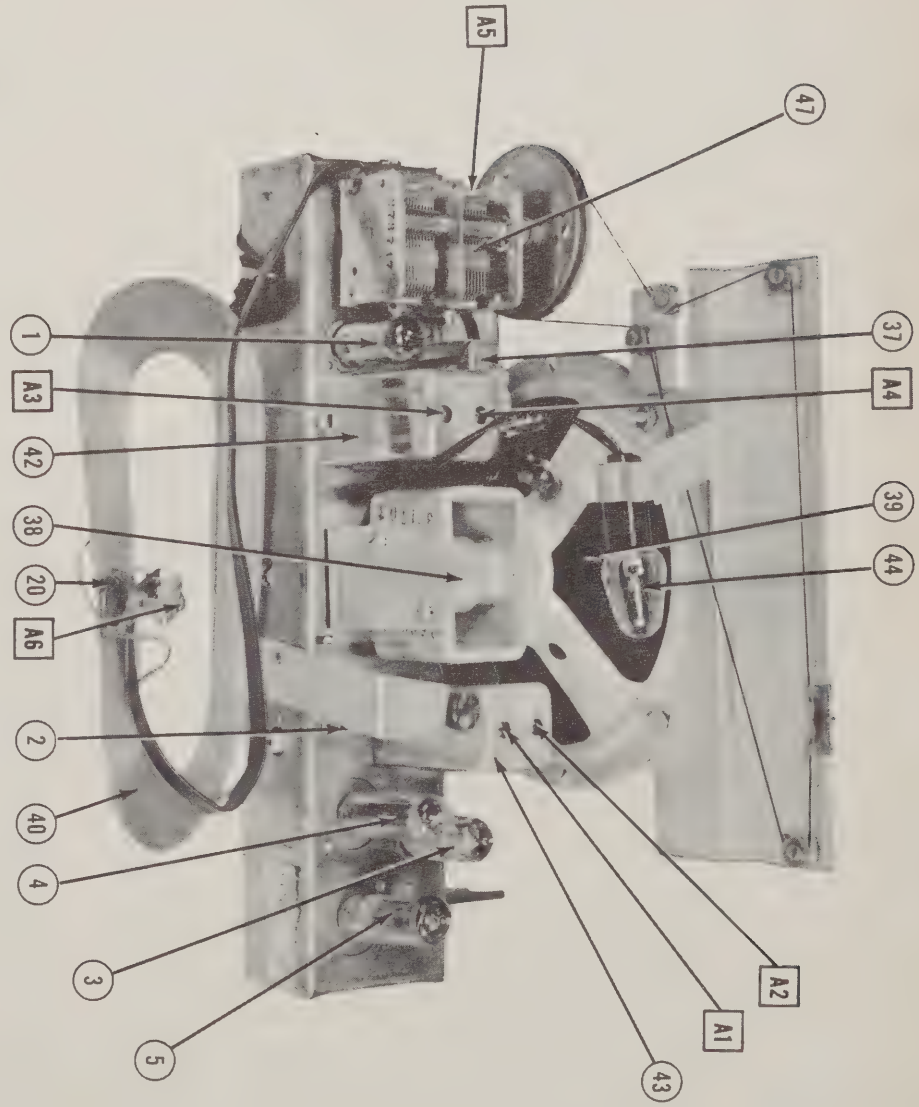
RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: BENDIX PART No.	IRC PART No.	IDENTIFICATION CODES
22	22KΩ	½	RC1H40	BTS-22K	Red-Red-Or. Osc. Grid
23	3.3 Meg.	½	RC1H68	BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
24	100Ω	½	RC1H12	BW-½-100	Br.-Blk.-Br. Voltage Dropping
25	47KΩ	½	RC1H44	BTS-47K	Yl.-Vi.-Or. Diode Filter
26	470KΩ	½	RC1H58	BTS-470K	Yl.-Vi.-Yl. Phono Shunt
27	1 Meg.	½	RC1H62	BTS-1 Meg.	Br.-Blk.-Grn. Series Phono
28	22KΩ	½	RC1H40	BTS-22K	Red-Red-Or. Tone Comp.
29	4.7 Meg.	½	RC1H70	BTS-4.7 Meg.	Yl.-Vi.-Grn. Audio Grid
30	220KΩ	½	RC1H54	BTS-220K	Red-Red-Yl. Audio Plate Load
31	470KΩ	½	RC1H58	BTS-470K	Yl.-Vi.-Yl. Output Grid
32	150Ω	1	RW1B28	BW-1-150	Output Cathode
33	150Ω	1	RW1B28	BW-1-150	Filter
34	1200Ω	2	RC4G24	BT-2-1200	"
35	15Ω	1	RW1A04	BW-1-15	Surge Limiter
36	220KΩ	½	RC1H54	BTS-220K	Red-Red-Yl. Line Isolation

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: BENDIX PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	INSTALLATION NOTES
37	2000Ω	3.3Ω	170Ω tapped @ 10Ω	.6Ω	TA0012	A-3876†		A-2928†	†Add extra filter to reduce hum level.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: BENDIX PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	VC IMP.		ST-110		
38	PM	3.3Ω	SP6R01	MOD.P6-V	6A21	
	CONE DIA.	VC DIA.				
39	5-7/8"	3/4"				

R F COILS

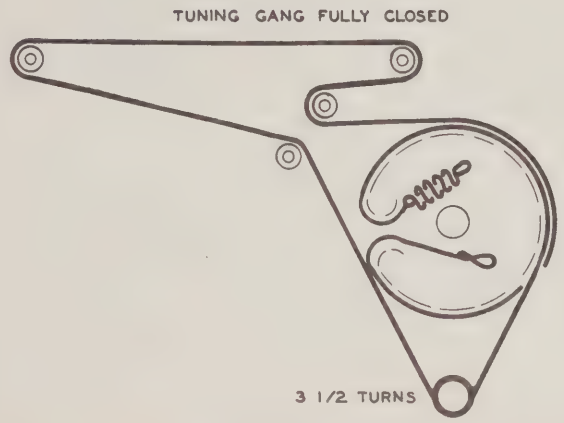
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: BENDIX PART No.	MEISSNER PART No.	
40	Ant. Loop		1.2Ω	AL0214		
41	BC Osc.Coil	.5Ω	4.5Ω	LO5B04	14-1060	
42	Input IF	22Ω	23Ω	TI0C08	16-6658	
43	Output IF	21.5Ω	21.5Ω	TI0D14		

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: BENDIX PART No.		INSTALLATION NOTES
44	Screw	120					Type C7

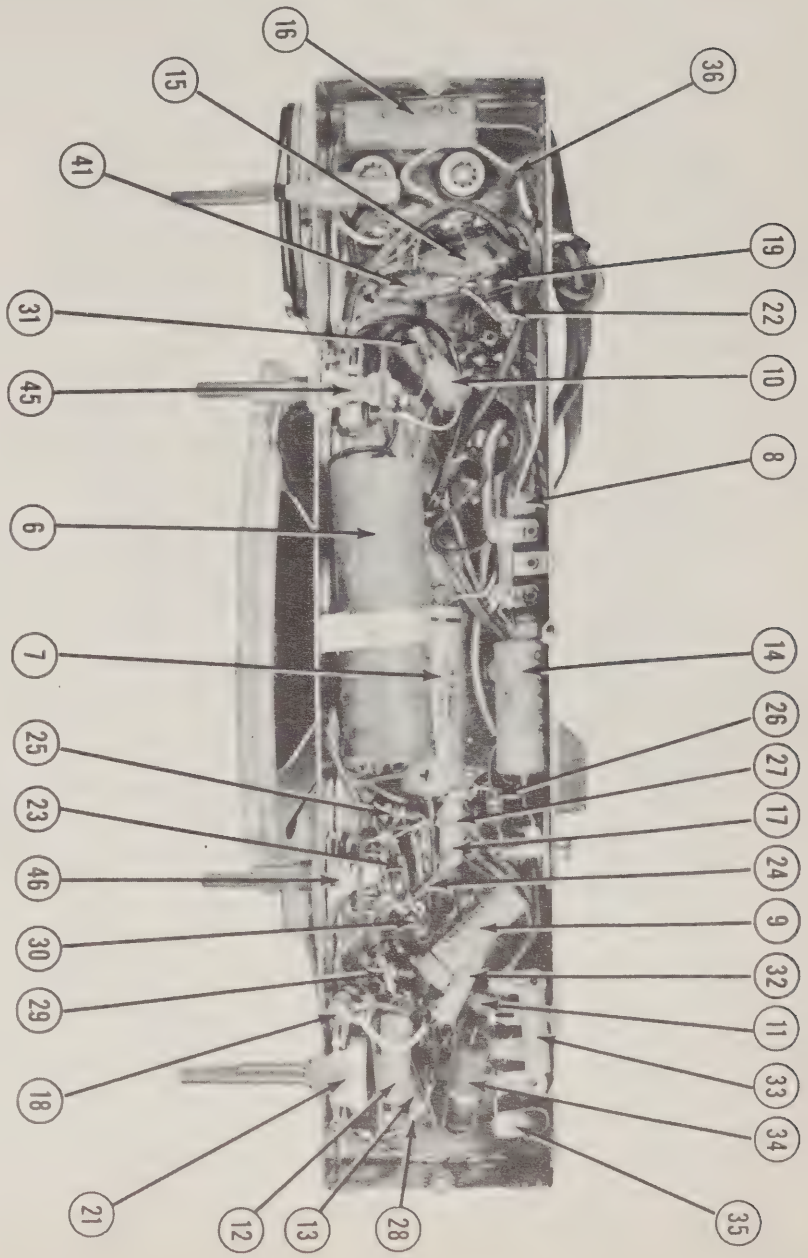
MISCELLANEOUS

ITEM No.	PART NAME	BENDIX PART No.	NOTES
45	Switch	SR3E04	Power-Tone
46	"	SR2B02	Radio-Phono
47	2 Gang Var. Cap.	CV0B04	(13-450MMF, 35-218MMF)
A6	Trimmer	CT1A18	Ant. Adj.
	Dial Pointer	ID0M19	
	Dial Scale	DS0A29	

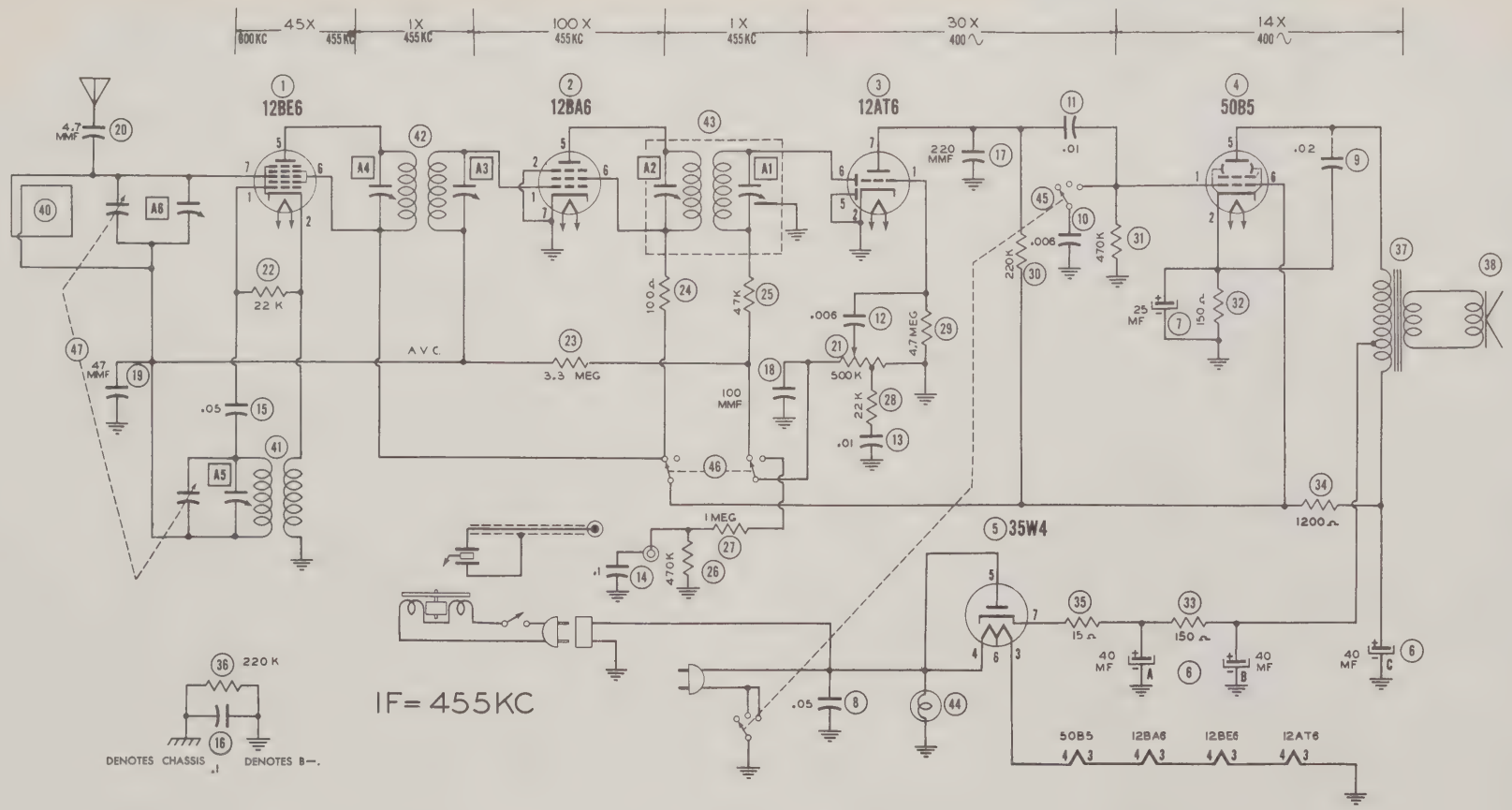


DIAL CORD DRIVE

CHASSIS—BOTTOM VIEW



BENDIX MODEL 613



VOLTAGE READINGS

RADIO-PHONO SWITCH IN RADIO POSITION.

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	12BE6	-8VDC§	0V.	13VAC	25VAC	90VDC	90VDC	-.4VDC
2	12BA6	-.4VDC	0V.	25VAC	38VAC	90VDC	90VDC	0V.
3	12AT6	-.6VDC	0V.	0V.	13VAC	0V.	-.4VDC	47VDC
4	50B5	0V.	5.5VDC	38VAC	84VAC	114VDC	90VDC	0V.
5	35W4	0V.	120VDC	84VAC	117VAC	117VAC	111VAC	130VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	12BE6	22KΩ	.5Ω	12Ω	23Ω	100KΩ	100KΩ	3.8 Meg
2	12BA6	3.8 Meg.	0Ω	23Ω	34Ω	100KΩ	100KΩ	0Ω
3	12AT6	4.7 Meg.	0Ω	0Ω	12Ω	0Ω	540KΩ	320KΩ
4	50B5	470KΩ	150Ω	34Ω	70Ω	100KΩ	100KΩ	470KΩ
5	35W4	INF.	100KΩ	70Ω	85Ω	85Ω	80Ω	100KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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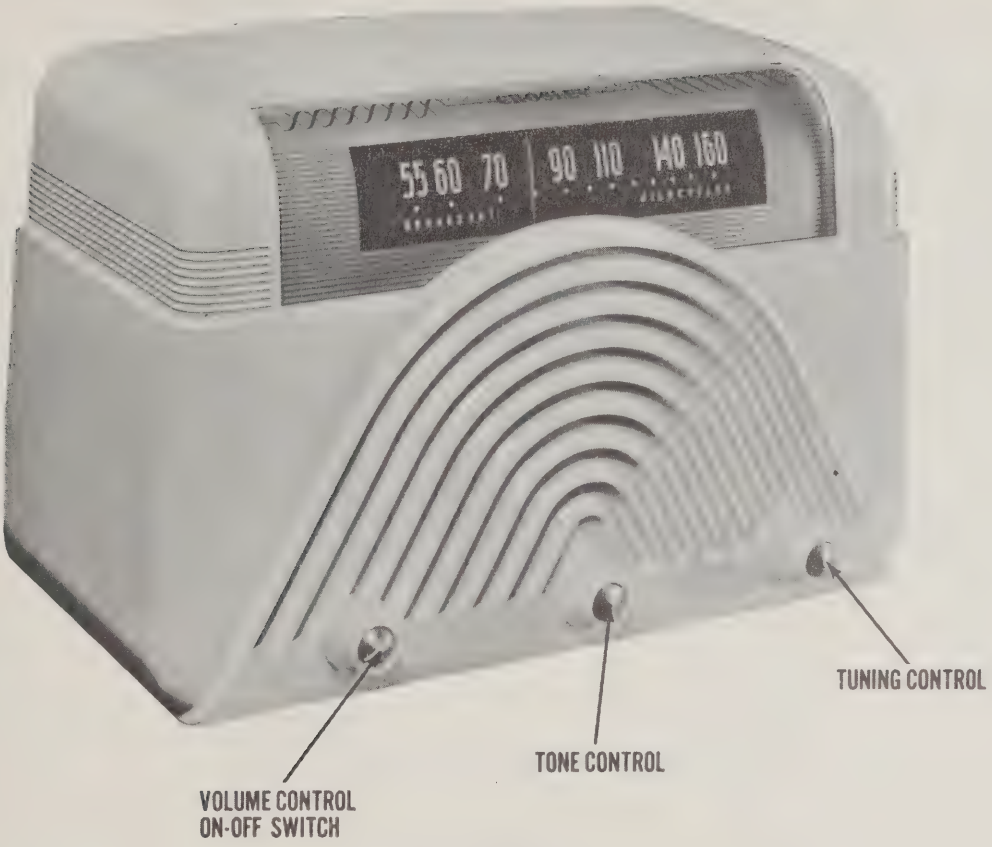
4810-3

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

CROSLEY MODELS
68TA, 68TW



CROSLEY MODELS
68TA, 68TW

CROSLEY MODEL 68TW

TRADE NAME	Crosley, Model 68TA, 68TW
MANUFACTURER	Crosley Corp., 1329 Arlington St., Cincinnati, Ohio
TYPE SET	AC Operated Superheterodyne Receiver with Loop Antenna
TUBES (SIX)	Types, 7A7 RF Amp., 7Q7 Converter, 7A7 IF Amp., 7B6 Det.-AVC-AF, 7B5 Power Output, 5AZ4 Rectifier.
POWER SUPPLY	105-125 Volts AC
TUNING RANGE—BROADCAST	540-1600KC RATING .46 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer 1¼" from left edge of dial backplate.

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.05 MFD	High side to Pin 6 (grid) of 7Q7. Low side to chassis.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output.
2	4 MMFD.	High side to top antenna clip. Low side to chassis.	1620KC	"	"	A5	" " " "
3	4 MMFD.	"	1400KC	Tune for maximum output.	"	A6,A7	Rock tuning cap. and adjust for maximum output. Repeat until no further improvement can be made.

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PARTS LIST AND DESCRIPTIONS

CROSLEY
MODELS 68TA, 68TW

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: CROSLEY PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	7A7	7A7	8Y	
2	Converter	7A7	7A7	8AL	
3	IF Amp.	7A7	7A7	8V	
4	Det.-AVC-AF	7B6	7B6	8W	
5	Power Output	7B5	7B5	6AE	
6	Rectifier	5AZ4	5AZ4		

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: CROSLEY PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
7A	[illegible]	300	B-136596	3-PRS350/24	UP6445	DY-2x40-450		Filter-Red
B	30	300						" -Blue
8	.005	600	39001-11	684-005	DT6D5	ST-6-005	TC-25	Output Plate Bypass
9	.01	400	39001-13	484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
10	.00025	600	39001-73	1468-00025	5W5T25	MO.5-325	1FM-325	AF Plate Bypass
11	.01	400	39001-13	484-01	DT4S1	ST-4-01	TC-11	Tone Compensation
12	.005	600	39001-11	684-005	DT6D5	ST-6-005	TC-25	" "
13	.001	600	39001-7	684-001	DT6D1	ST-6-001	TC-21	Audio Coupling
14	.01	600	39001-13	684-01	DT6S1	ST-6-01	TC-11	IF Plate Decoup.
15	.05	400	39001-17	484-05	DT4S5	ST-4-05	TC-15	Conv. Screen Bypass
16	.02	600		684-02	DT6S2	ST-6-02	TC-12	AVC Filter
17	.001	600	39001-7	684-001	DT6D1	ST-6-001	TC-21	RF Coupling
18	.05	400	39001-17	484-05	DT4S5	ST-4-05	TC-15	IF Screen Bypass
19	12	300	C-137727-52	1468-00001	5W5Q1	MO.5-41	FS-41	Osc. Grid Cap.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: CROSLEY PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
20A	1 Meg.	½	39368-18	D13-137X		Volume Control B-136595 tapped @ 300KΩ
B	Shaft		39370-2	E		Attach to 20A per instructions
C	Switch		39369-1	41		" " " " "
21A	2 Meg.	½	39368-11	D13-139	AM-66-Z	Tone Control B-142857
B	Shaft		39370-2	E	KSS-3	Attach to 21A per instructions

RESISTORS

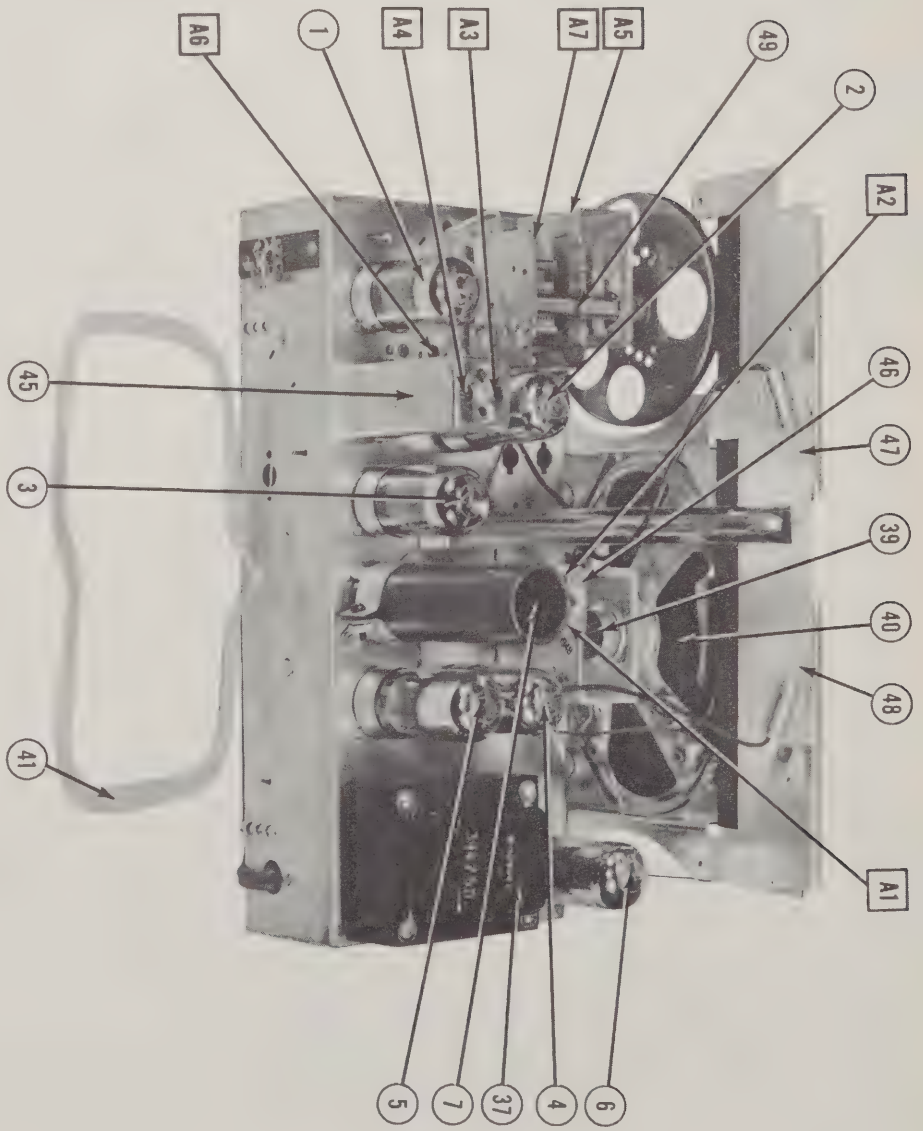
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: CROSLEY PART No.	IRC PART No.	IDENTIFICATION CODES
22	2.2 Meg.	½	39373-87	BTS-2.2 Meg.	Red-Red-Grn. RF Grid
23	2.2 Meg.	½	39373-97	BTS-2.2 Meg.	Red-Red-Grn. AVC Network
24	27KΩ	½	39373-60	BTS-27K	Red-Red-Or. RF Coil Shunt
25	1 Meg.	½	39373-92	BTS-1 Meg.	Br.-Blk.-Grn. Converter Grid
26	22KΩ	½	39373-60	BTS-22K	Red-Red-Or. Osc. Grid
27	12KΩ	1	39373-165	BTA-12K	Br.-Red-Or. Converter Screen
28	22KΩ	½	39373-60	BTS-22K	Red-Red-Or. Screen Dropping
29	2.2 Meg.	½	39373-97	BTS-2.2 Meg.	Red-Red-Grn. AVC Network
30	2200Ω	½	39373-40	BTS-2200	Red-Red-Red IF Plate Decoupling
31	47KΩ	½	39373-67	BTS-47K	Red-Vi.-Or. Tone Comp.
32	10 Meg.	½	39373-107	BTS-10 Meg.	Br.-Blk.-Blue AF Grid
33	330KΩ	½	39373-84	BTS-330K	Or.-Or.-Yl. AF Plate Load
34	470KΩ	½	39373-87	BTS-470K	Yl.-Vi.-Yl. Output Grid
35	330Ω	½	39373-23	BW-½-330	Or.-Or.-Br. Output Cathode
36	1500Ω	10	39372-7	AB-1500	Br.-Grn.-Red Filter

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: CROSLEY PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
37	117V AC @ .46A	520V CT @ .071A	4.8V AC @ 1.8A	6.4V AC @ 2.0A	B-136597	P-6011*	T22R02*	P-2051*

*Add series resistor to reduce plate voltage.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		CROSLEY PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
38	12KΩ	4.4Ω	900Ω	.7Ω	B-138598	A-3856	T-2S47	A-2032	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			CROSLEY PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	VC IMP.				
39	PM	4.4Ω	138246		46A1	
	CONE DIA.	VC DIA.				
40	4"x6"	1/2"				

R F COILS

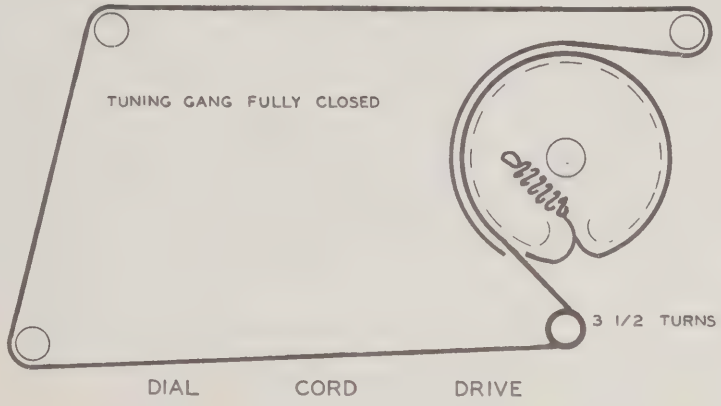
ITEM No.	USE	DC RES.		REPLACEMENT DATA	
		PRI.	SEC.	CROSLEY PART No.	MEISSNER PART No.
41	Ant. Loop		.7Ω	AC-138464	
42	Ant. Load. Coil		5.8Ω	AW-138546	
43	RF Coil	137Ω	11.7Ω	AW-137800	
44	Osc. Coil		12.3Ω	AW-137724	
45	Input IF	10.8Ω	10.8Ω	AC-137933	
46	Output IF	10.8Ω		AC-137934	16-6670

DIAL LIGHT

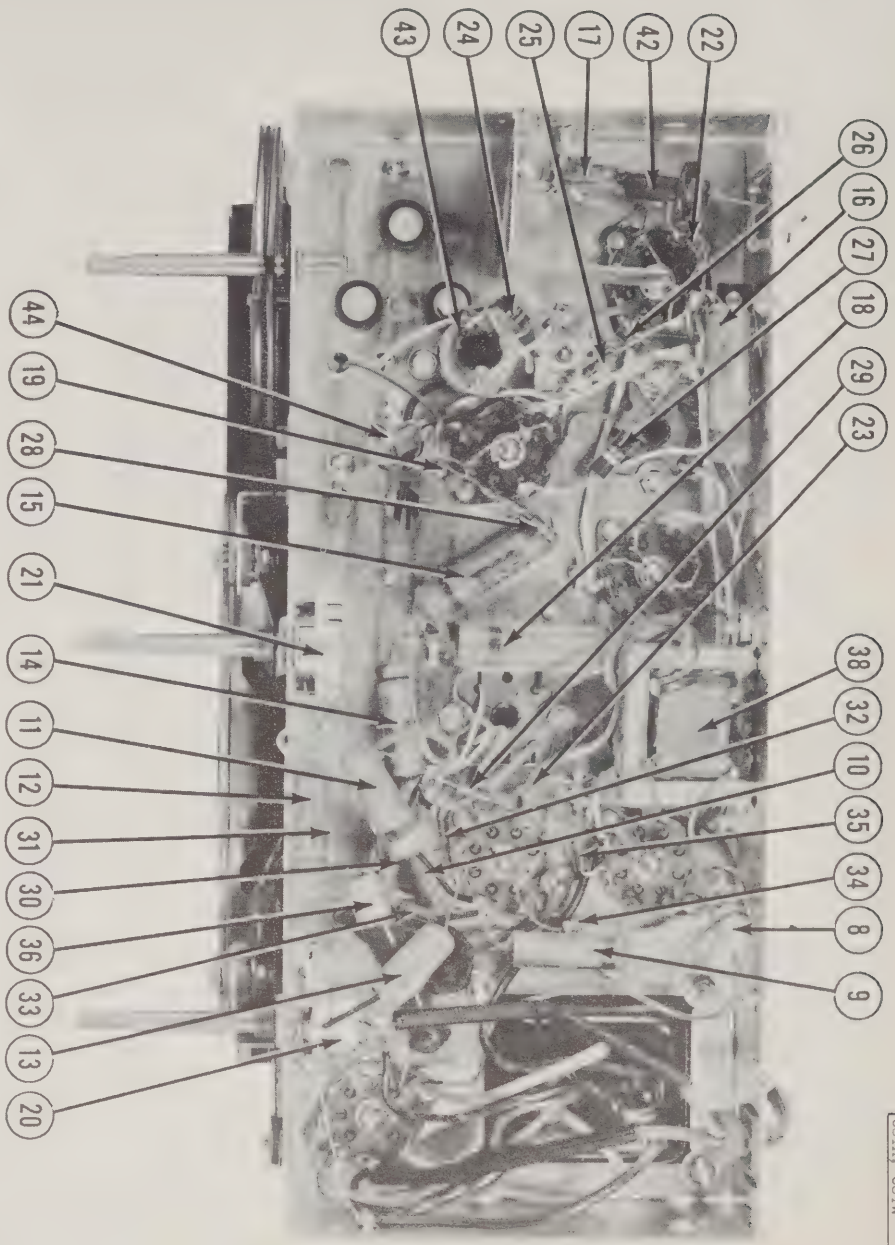
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					CROSLEY PART No.		
47	Bayonet	6-8	0.15	Brown	W-48858		Type 47
48	"	"	"	"	W-48858		" "

MISCELLANEOUS

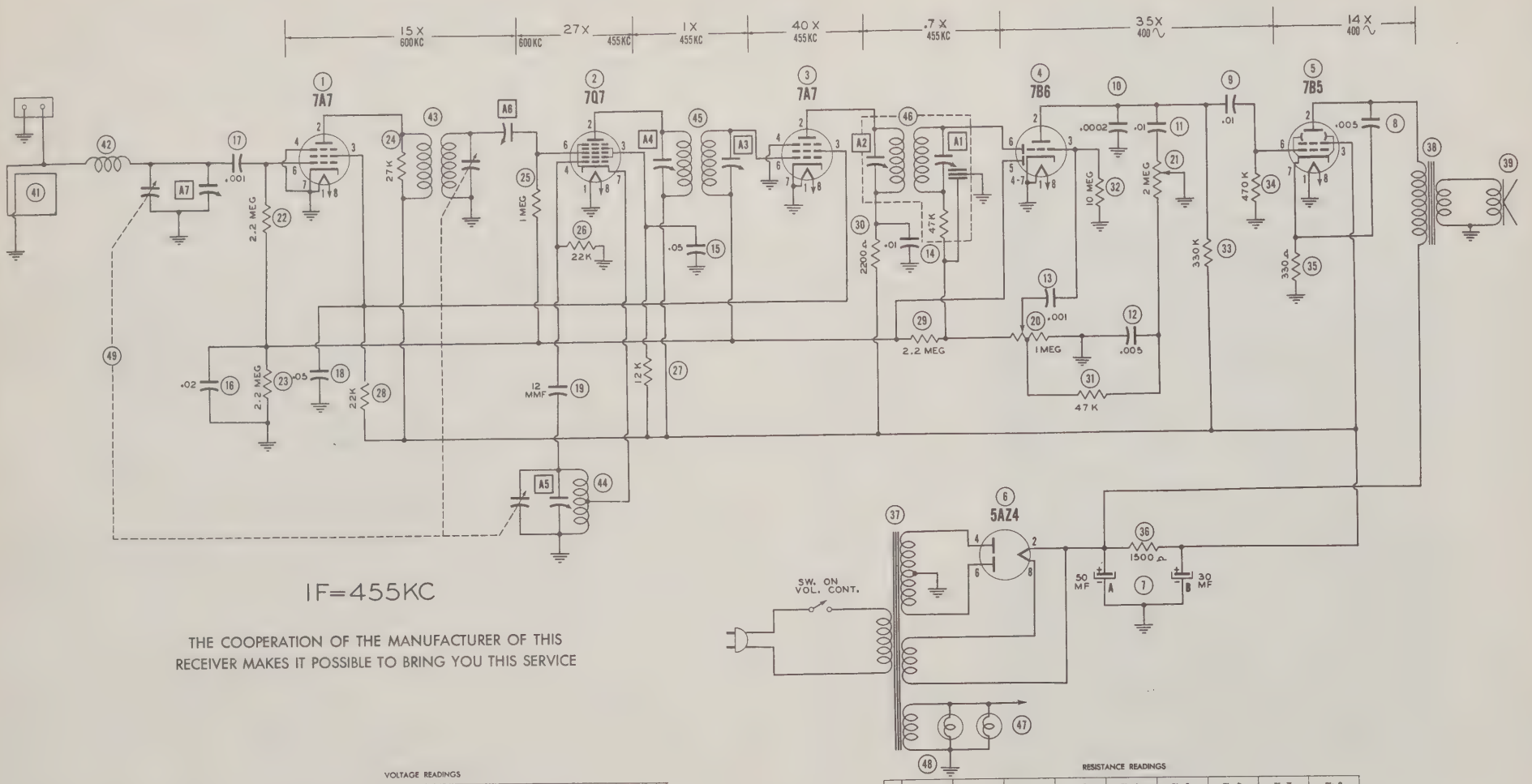
ITEM No.	PART NAME	CROSLEY PART No.	NOTES
49	3 Gang Var. Cap.	AC-138505-2	(25-328MMF, 12-111MMF, 15-87MMF)
A6	Trimmer	W-132267-1	RF Adj.
	Dial	C-143138	Glass
	Dial Pointer	143142	
	Knob	B-138574-5	(Model 66TA)
	"	B-138574-2	(Model 66TW)
	Cabinet	R-138573-1	(Model 66TA)
	"	AW-138663	(Model 66TW)



CHASSIS—BOTTOM VIEW



CROSLEY MODELS 68TA, 68TW



IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	7A7	0V.	195VDC	85VDC	0V.	0V.	-.1VDC	0V.	6.4VAC
2	7Q7	0V.	195VDC	87VDC	-8VDC§	0V.	-.3VDC	0V.	6.4VAC
3	7A7	0V.	175VDC	85VDC	0V.	0V.	-.6VDC	0V.	6.4VAC
4	7B6	0V.	80VDC	-.4VDC	0V.	-.6VDC	-.6VDC	0V.	6.4VAC
5	7B5	0V.	230VDC	165VDC	0V.	0V.	0V.	8.5VDC	6.4VAC
6	5AZ4	0V.	250VDC	0V.	260VAC	0V.	260VAC	0V.	250VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	7A7	0Ω	100KΩ	120KΩ	0Ω	0Ω	3.7 Meg.	0Ω	.1Ω
2	7Q7	0Ω	100KΩ	110KΩ	22KΩ	0Ω	2.5 Meg.	1Ω	.1Ω
3	7A7	0Ω	100KΩ	120KΩ	0Ω	0Ω	1.1 Meg.	0Ω	.1Ω
4	7B6	0Ω	430KΩ	10 Meg.	0Ω	850KΩ	1.25 Meg.	0Ω	.1Ω
5	7B5	0Ω	100KΩ	100KΩ	INF.	INF.	470KΩ	330Ω	.1Ω
6	5AZ4	INF.	100KΩ	INF.	225Ω	INF.	215Ω	INF.	100KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

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4810-4

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

EMERSON MODEL
576A (Ch. 120069A)

EMERSON MODEL
576A (Ch. 120069A)

EMERSON MODEL 576A

TRADE NAME	Emerson, Model 576A (Ch. 120069A)
MANUFACTURER	Emerson Radio & Phono Corp., 111 8th Ave., New York, N.Y.
TYPE SET	AC Operated Combination Phono-Radio Superheterodyne Receiver with Loop Antenna
TUBES (FIVE)	Types, 12BE6 Converter, 12BA6 IF Amp., 12AT6 Det.-AVC-AF, 50B5 Power Output, 35W4 Rectifier.
POWER SUPPLY	110-120 Volts AC
TUNING RANGE—BROADCAST	540-1620KC RATING .25 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to 2¼" from top right edge of dial backplate. This is calibration mark referred to below.

Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to Pin 7 (grid) of 12BE6. Low side to B-.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD. to reduce hum modulation.
2	200MMFD	High side to ext. ant. lead. Low side to ext. ground lead.	1600KC	4-1/4" from calibration mark.	"	A5	Adjust for maximum output.
3	200MMFD	"	1500KC	Tune for maximum output.	"	A6	" " " "

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PARTS LIST AND DESCRIPTIONS

EMERSON MODEL 576A

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: EMERSON PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	12BE6	12BE6	7CH	
2	IF Amp.	12BA6	12BA6	7BK	
3	Det.-AVC-AF	12AT6	12AT6	7BT	
4	Power Output	50B5	50B5	7BZ	
5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: EMERSON PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
6A	50	150	925012		EZ5515	DSB-2x50-150	TA-505	Filter
B	50	150						"
7	.05	400	920030	484-05	DT4S5	ST-4-05	TC-15	Line Filter
8	.05	400	920030	484-05	DT4S5	ST-4-05	TC-15	Tone Compensation
9	.02	400	920020	484-02	DT4S2	ST-4-02	TC-12	Audio Coupling
10	.002	600	920010	684-002	DT6D2	ST-6-002	TC-22	" "
11	.1	200	920040	484-.1	DT2P1	ST-2-1	TC-1	AVC Filter
12	.05	400	920030	484-05	DT4S5	ST-4-05	TC-15	Phono Isolation
13	.2	200	920050	484-.2	DT2P2	ST-2-2	72P3	Line Isolation
14	220	300	910000	1468-00025	5W5T25	MO.5-325	1FM-325	AF Plate Bypass-Cer.
15	220	300	910000	1468-00025	5W5T25	MO.5-325	1FM-325	Phono Tone Compensation-Cer.
16	100	300	910010	1468-0001	5W5T1	MO.5-31	1FM-31	Diode RF Filter-Cer.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: EMERSON PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
17A	500KΩ	½	390042	D11-133	AM-58-S	Volume Control
B	Shaft		Not Req.	E	KSS-3	Attach to 17A per instructions
C	Switch		" "	41	SW-A	" " " " "

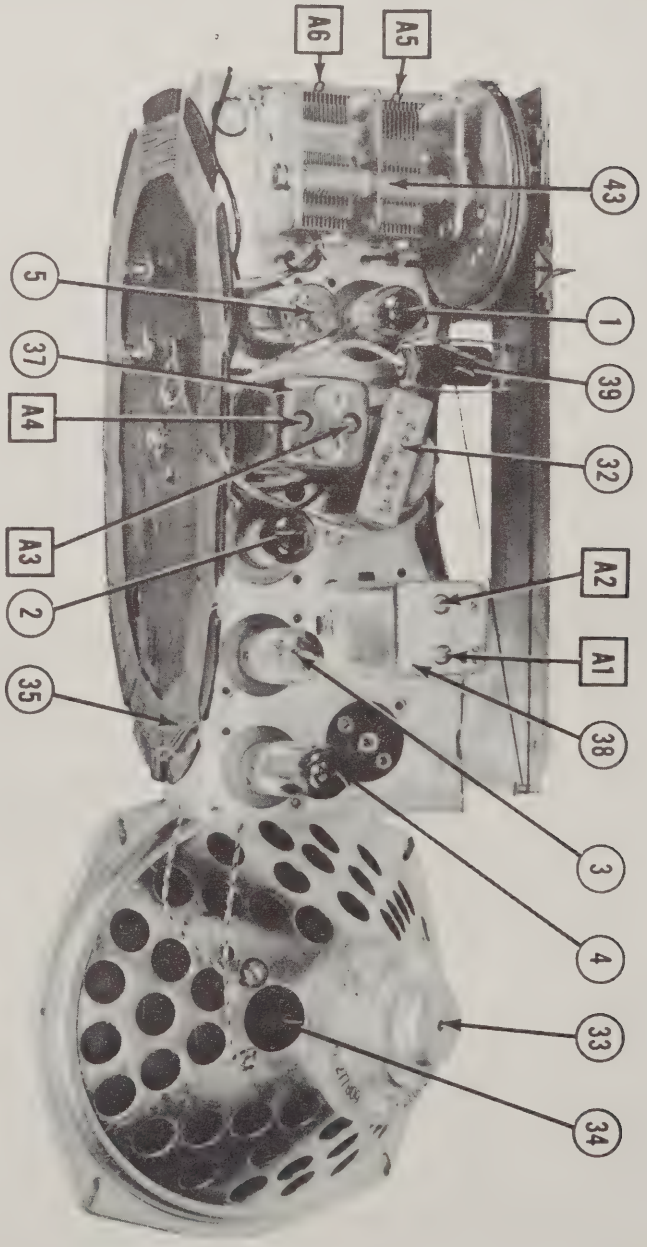
RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: EMERSON PART No.	IRC PART No.	IDENTIFICATION CODES
18	22KΩ	½	340810	BTS-22K	Red-Red-Or. Osc. Grid
19	15 Meg.	½	397000	BTS-15 Meg.	Br.-Grn.-Blue AVC Network
20	100Ω	½	340250	BW-½-100	Br.-Blk.-Br. IF Cathode
21	3.3 Meg.	½	351330	BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
22	15 Meg.	½	397000	BTS-15 Meg.	Br.-Blk.-Blue Audio Grid
23	470KΩ	½	351130	BTS-470K	Yl.-Vi.-Yl. Audio Plate Load
24	470KΩ	½	351130	BTS-470K	Yl.-Vi.-Yl. Output Grid
25	150Ω	½	340290	BW-½-150	Br.-Grn.-Br. Output Cathode
26	4700Ω	½	340650	BTS-4700	Yl.-Vi.-Red Tone Compensation
27	2.2 Meg.	½	351290	BTS-2.2 Meg.	Red-Red-Grn. Feedback
28	1 Meg.	½	351210	BTS-1 Meg.	Br.-Blk.-Grn. Phono Tone Comp.
29	1000Ω	1	370490	BTA-1000	Br.-Blk.-Red Filter
30	39Ω	1	370150	BW-1-39	Or.-White-Blk. Rectifier Ballast
31	220KΩ	½	351050	BTS-220K	Red-Red-Yl. Line Isolation

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: EMERSON PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	INSTALLATION NOTES
32	2100Ω	4Ω	142Ω tapped @ 7Ω	.6Ω	734080	A-3276*		A-2928*	*Add extra filter to reduce hum level.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: EMERSON PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	VC IMP.				
33	PM	4Ω	180037		69A3	
	CONE DIA.	VC DIA.				
34	6"x9"	1"				

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: EMERSON PART No.	MEISSNER PART No.	
35	Loop Ant.	.1Ω	1Ω	700025		
36	Osc. Coil	.5Ω	5.5Ω	716010	14-1060	†Add 47KΩ in series with low side of sec. winding to junction of Item #16 and Radio-Phono switch.
37	Input IF	35Ω	23Ω	720220	16-6666	
38	Output IF	22Ω		720039	16-6667†	

DIAL LIGHT

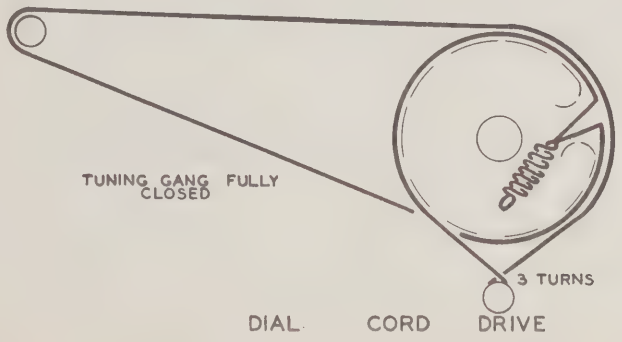
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: EMERSON PART No.		INSTALLATION NOTES
39	Bayonet	6-8	0.15	Brown	807000		Type 47

PHONO CARTRIDGE

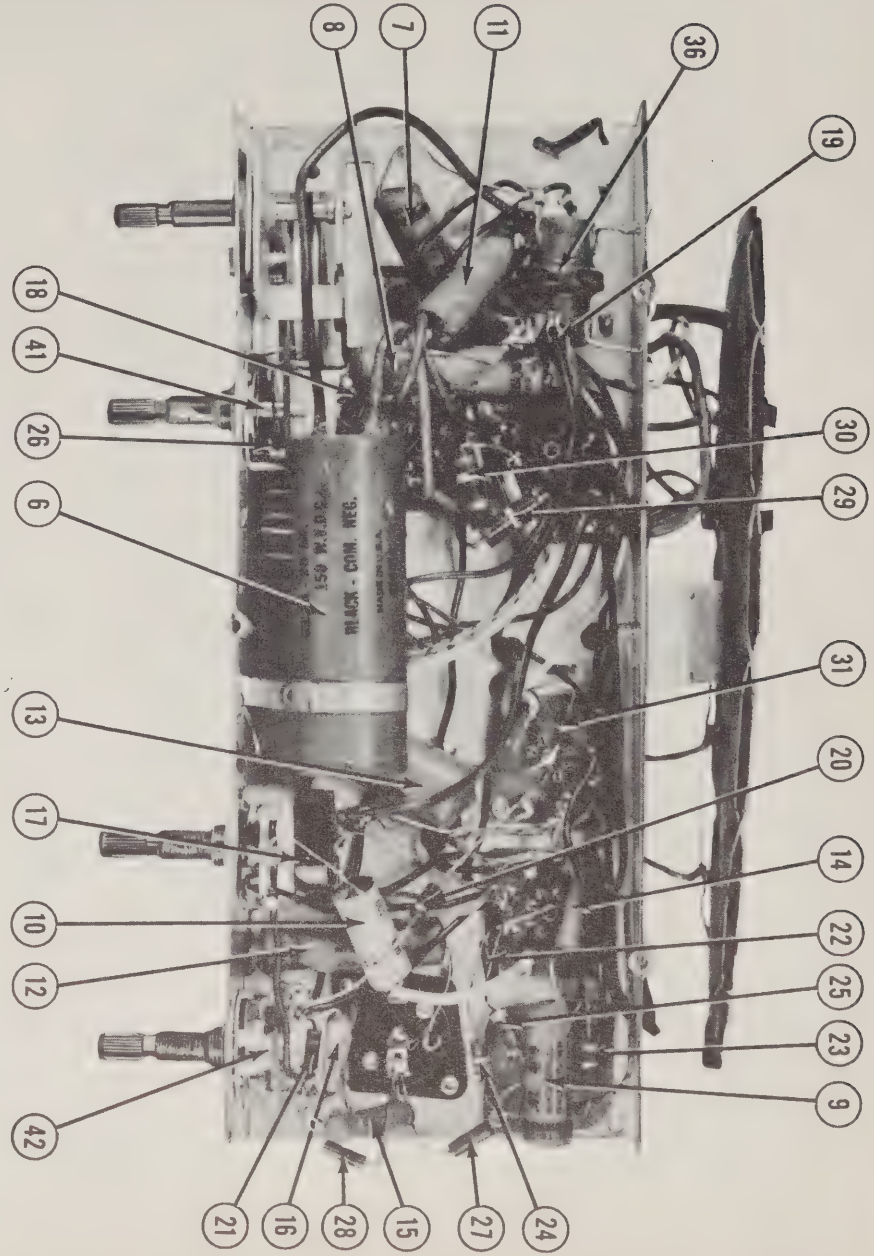
ITEM No.	REPLACEMENT DATA: EMERSON PART No.	ASTATIC PART No.	REMARKS
40		L-70-A	L-70 Original Part

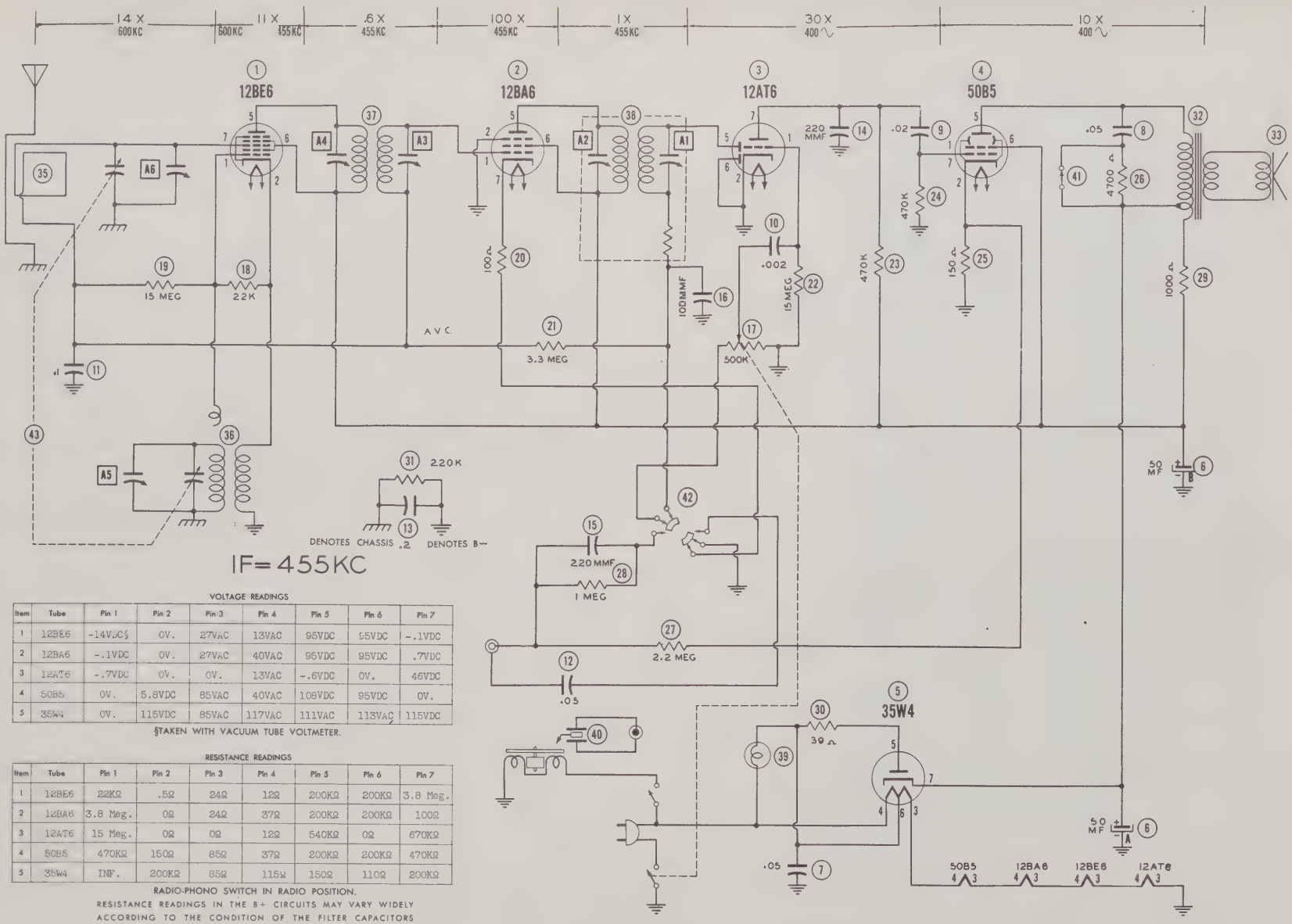
MISCELLANEOUS

ITEM No.	PART NAME	EMERSON PART No.	NOTES
41	Switch	510120	Tone
42	"	510391	Phono-Radio
43	2 Gang Var. Cap.	900070	(25-380MMF, 25-190MMF)
	Dial Glass	520062	
	Dial Pointer	525028	



CHASSIS—BOTTOM VIEW





IF=455KC

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	12BE6	-14VDC§	0V.	27VAC	13VAC	95VDC	95VDC	-.1VDC
2	12BA6	-.1VDC	0V.	27VAC	40VAC	95VDC	95VDC	.7VDC
3	12AT6	-.7VDC	0V.	0V.	13VAC	-.6VDC	0V.	46VDC
4	50B5	0V.	5.8VDC	85VAC	40VAC	108VDC	95VDC	0V.
5	35W4	0V.	115VDC	85VAC	117VAC	111VAC	113VAC	115VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	12BE6	22KΩ	.5Ω	24Ω	12Ω	200KΩ	200KΩ	3.8 Meg.
2	12BA6	3.8 Meg.	0Ω	24Ω	37Ω	200KΩ	200KΩ	100Ω
3	12AT6	15 Meg.	0Ω	0Ω	12Ω	540KΩ	0Ω	670KΩ
4	50B5	470KΩ	150Ω	85Ω	37Ω	200KΩ	200KΩ	470KΩ
5	35W4	INF.	200KΩ	85Ω	115Ω	150Ω	110Ω	200KΩ

RADIO-PHONO SWITCH IN RADIO POSITION.
RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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4810-5

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. **DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.**
2. **Socket connections are shown as bottom views.**
3. **Measured values are from socket pin to common negative.**
4. **Line voltage maintained at 117 volts for voltage readings.**
5. **Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.**
6. **Volume control at maximum, no signal applied for voltage measurements.**

GAROD MODEL
5A4

GAROD MODEL
5A4

GAROD MODEL 5A4

TRADE NAME	Garod, Model 5A4
MANUFACTURER	Garod Radio Corp., 70 Washington St., Brooklyn 1, N.Y.
TYPE SET	AC-DC Operated Superheterodyne Receiver with Loop Antenna
TUBES (FIVE)	Types, 12SA7GT Converter, 14A7 IF Amp., 12SQ7GT Det.-AVC-AF, 50L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	105-125 Volts AC-DC
TUNING RANGE—BROADCAST	540-1650KC RATING .27 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer if available. If not, connect a .1 MFD capacitor in series with low side of signal generator and chassis.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to rear stator tuning cap. Low side to chassis.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD. to reduce hum modulation.
2		Loop	1650KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	1500KC	Tune for maximum output.	"	A6	Adjust for maximum output. The adjustment opposite A6 is a factory adjustment and ordinarily need not be changed.

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

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PARTS LIST AND DESCRIPTIONS

GAROD MODEL 5A4

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: GAROD PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	12SA7GT	12SA7GT	8AD	
2	IF Amp.	14A7	14A7	8V	
3	Det.-AVC-AF	12SQ7GT	12SQ7GT	8Q	
4	Power Output	50L6GT	50L6GT	7AC	
5	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: GAROD PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
6A	40	150	5.400-8	AF888D	UP44415	DY-3x40-150	EL-340	▲ Filter
B	40	150						■ "
C	20	150						▪ "
7	.05	400		484-05	DT4S5	ST-4-05	TC-15	Line Filter
8	.02	400		484-02	DT4S2	ST-4-02	TC-12	Output Plate Bypass
9	.01	400		484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
10	.01	400		484-01	DT4S1	ST-4-01	TC-11	" "
11	.02	200		484-02	DT2S2	ST-4-02	TC-12	AVC Filter
12	250	300		1468-00025	5W5T25	MO.5-325	1FM-325	AF Plate Bypass-Cer.
13	250	300		1468-00025	5W5T25	MO.5-325	1FM-325	Diode RF Filter-Cer.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: GAROD PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
14A	1 Meg.	½	8.201-3	D13-137	AM-63-Z	Volume Control
B	Shaft		Not Req.	E	KSS-3	Attach to 14A per instructions
C	Switch		" "	41	SW-A	" " " " "

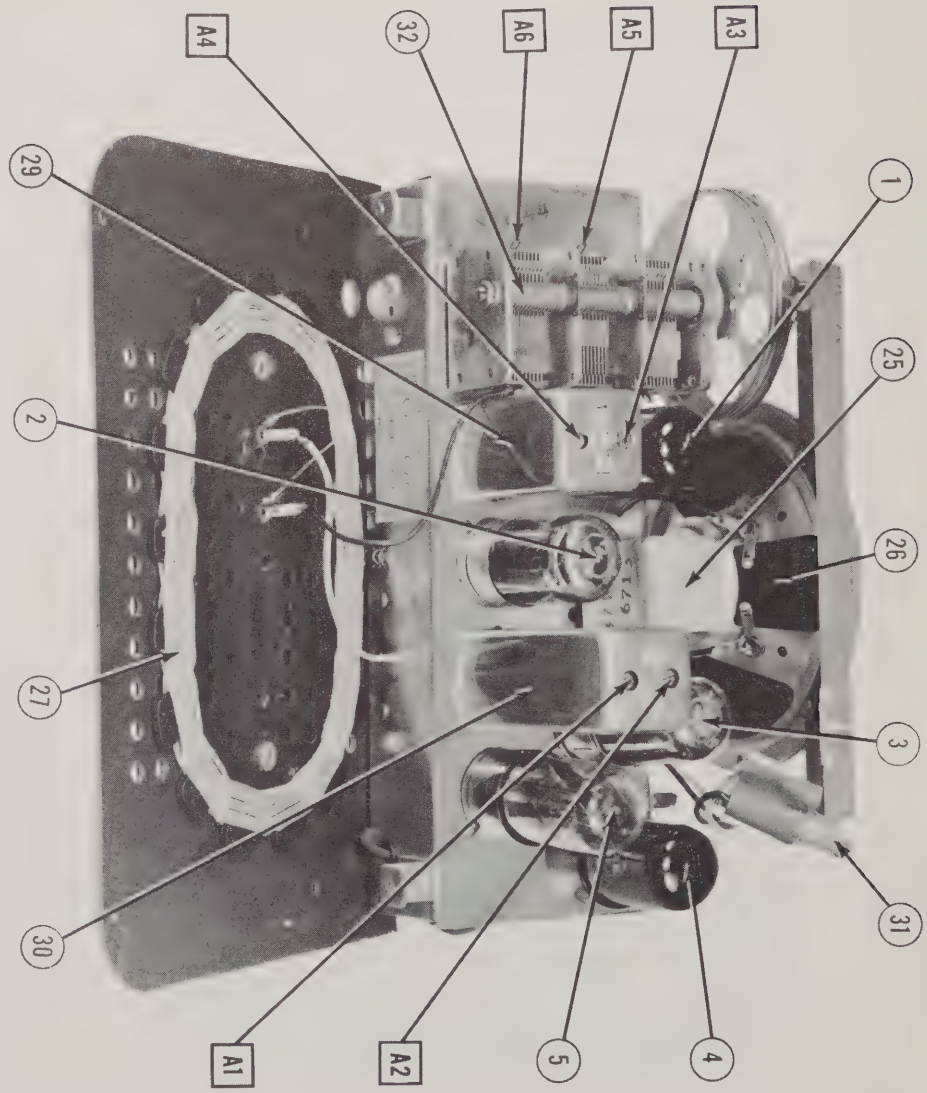
RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: GAROD PART No.	IRC PART No.	IDENTIFICATION CODES
15	22KΩ	½		BTS-22K	Red-Red-Or. Oscillator Grid
16	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. AVC Network
17	47KΩ	½		BTS-47K	Yl.-Vi.-Or. Diode Filter
18	2.2 Meg.	½		BTS-2.2 Meg.	Red-Red-Grn. AF Grid
19	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AF Plate
20	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. Output Grid
21	150Ω	½		BW-½-150	Br.-Grn.-Br. Output Cathode
22	1000Ω	1		BT-2-1000	Br.-Blk.-Red Filter
23	100Ω	½		BW-½-100	Br.-Blk.-Br. "

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: GAROD PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	INSTALLATION NOTES
24	2000Ω	3.5Ω	190Ω	.8Ω	9.219	A-3876	T22S45	A-2028	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: GAROD PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	VC IMP.		ST-105		
25	PM	3.5Ω	30.318	Mod. P5-X	5A07	
	CONE DIA.	VC DIA.				
26	4-5/8"	1/2"				

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: GAROD PART No.	MEISSNER PART No.
27	Loop Ant.	-	2.5Ω	1.469	
28	Osc. Coil	.8Ω	6.5Ω	1.402-I	14-1060
29	Input IF	43Ω	42Ω	1.259	16-6658
30	Output IF	42Ω	44Ω	1.409	16-6660

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: GAROD PART No.		INSTALLATION NOTES
31	Bayonet	6-8	0.15	Brown			Type 47

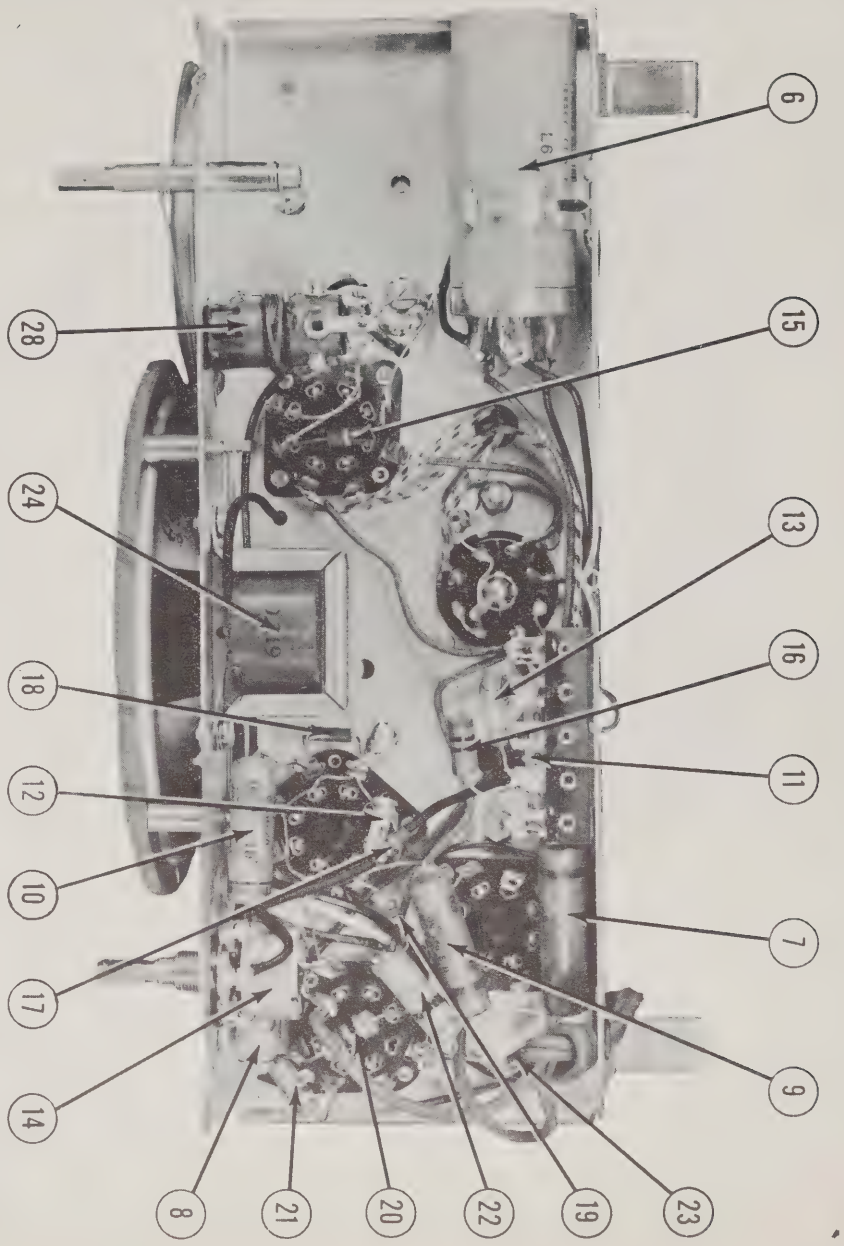
MISCELLANEOUS

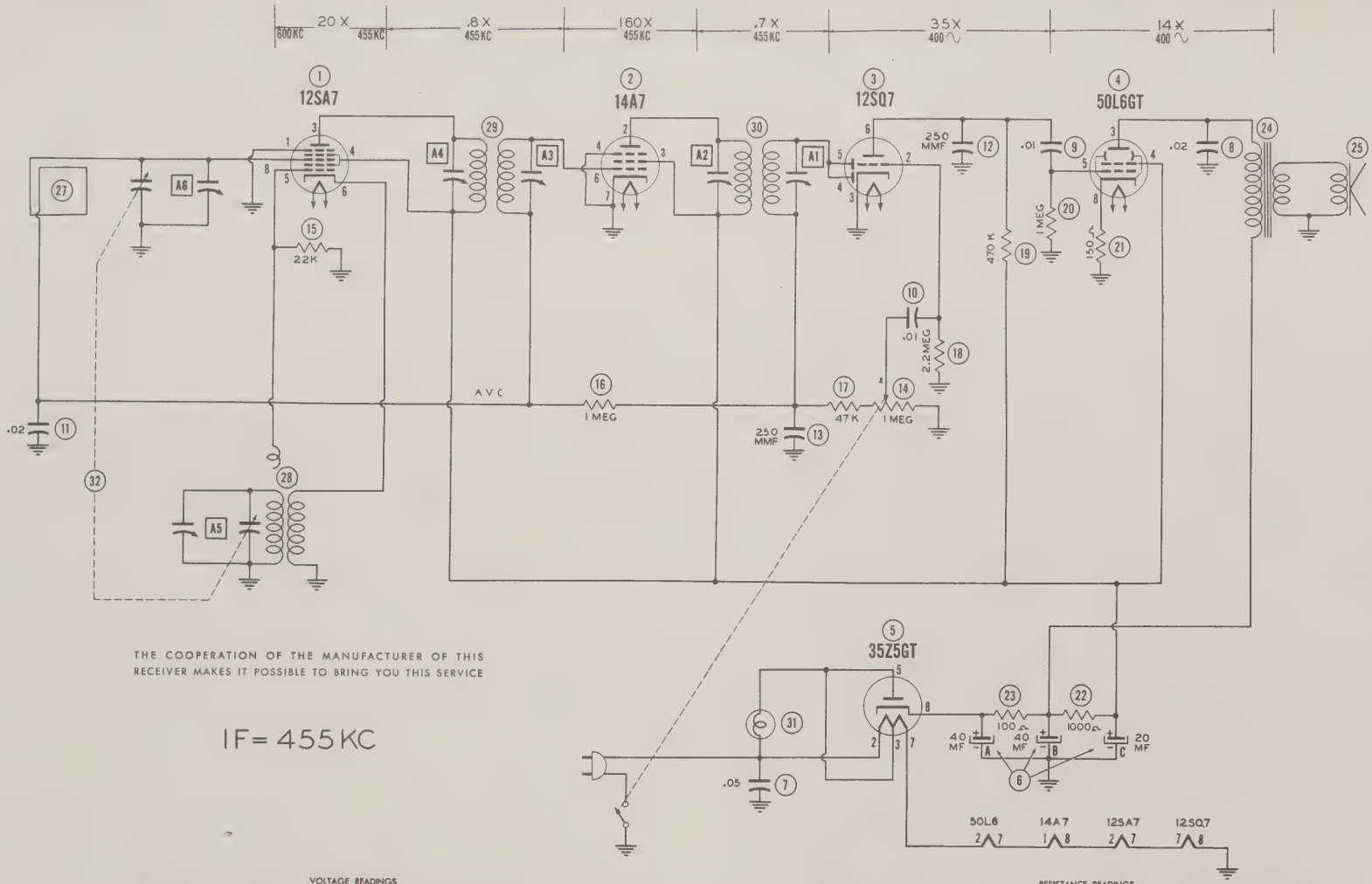
ITEM No.	PART NAME	GAROD PART No.	NOTES
32	2 Gang Var. Cap.	2.163	(37-400MMF, 37-200MMF)

TUNING GANG FULLY CLOSED

DIAL CORD DRIVE

CHASSIS—BOTTOM VIEW





THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

IF = 455 KC

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7GT	0V.	26VAC	87VDC	87VDC	-14VDC§	0V.	13VAC	-.5VDC
2	14A7	39VAC	87VDC	87VDC	0V.	0V.	-.5VDC	0V.	26VAC
3	12SQ7GT	0V.	-.5VDC	0V.	-.7VDC	-.7VDC	45VDC	13VAC	0V.
4	50L6GT	0V.	38VAC	105VDC	87VDC	0V.	112VDC	39VAC	6.4VDC
5	35Z5GT	0V.	117VAC	114VAC	0V.	114VAC	0V.	88VAC	120VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7GT	0Ω	26Ω	41KΩ	41KΩ	22KΩ	.8Ω	13Ω	2 Meg.
2	14A7	39Ω	41KΩ	41KΩ	0Ω	0Ω	2 Meg.	0Ω	26Ω
3	12SQ7GT	0Ω	2.2 Meg.	0Ω	1 Meg.	1 Meg.	51KΩ	13Ω	0Ω
4	50L6GT	0Ω	86Ω	40KΩ	41KΩ	1 Meg.	40KΩ	39Ω	150Ω
5	35Z5GT	INF.	117Ω	111Ω	INF.	111Ω	INF.	86Ω	40KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

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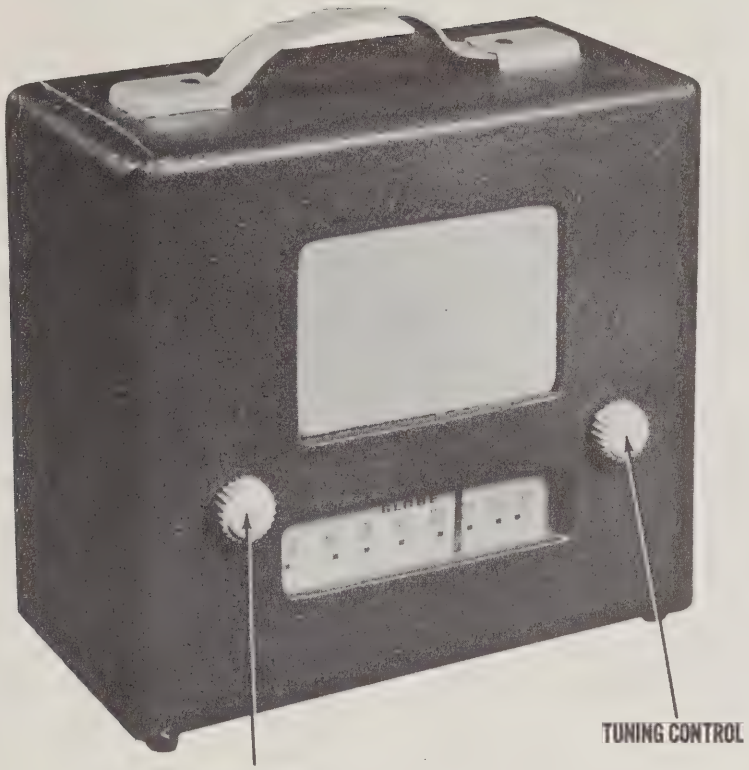
4810-6

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of + 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

GLOBE MODEL 456
BATTERY OPERATED



GLOBE MODEL 456
BATTERY OPERATED

GLOBE MODEL 456

TRADE NAME	Globe, Model 456
MANUFACTURER	Globe Electronics Inc., 225 W. 17th St., New York, N.Y.
TYPE SET	Battery Operated Portable Superheterodyne Receiver with Loop Antenna
TUBES (FOUR)	Types, 1R5 Converter, 1T4 IF Amp., 1S5 Det.-AVC-AF, 3Q4 Power Output
POWER SUPPLY	1.5 Volts "A" Supply and 67.5 Volt "B" Supply
RATING	240MA @ 1.5 Volts DC and 10.5MA @ 67.5 Volts DC
TUNING RANGE—BROADCAST	540-1650KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is in cabinet. Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	Rear stator of tuning cap. Low side to B-.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output.
2		Loop	1650KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	1500KC	Tune for maximum output.	"	A6	"

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PARTS LIST AND DESCRIPTIONS

GLOBE MODEL 456

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		GLOBE PART No.	STANDARD REPLACEMENT		
1	Converter	1R5	1R5	7AT	
2	IF Amp.	1T4	1T4	6AR	
3	Det.-AVC-AF	1S5	1S5	6AU	
4	Power Output	3Q4	3Q4	7BA	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	GLOBE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
5	10	150		PRS150-12	BR1215	M-10-150	UT-121	Pwr. Supply Bypass
6	.0018	400		484-002	DT6D2	ST-6-002	TC-22	Output Plate Bypass
7	.01	400		484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
8	.0018	400		484-002	DT6D2	ST-6-002	TC-22	" "
9	.01	400		484-01	DT4S1	ST-4-01	TC-11	AF Screen Bypass
10	.05	400		484-05	DT4S5	ST-4-05	TC-15	AVC Filter
11	.01	400		484-01	DT4S1	ST-4-01	TC-11	IF Screen Bypass
12	50	500		1468-00005	5W5Q5	MO.5-45	1FM-45	IF Plate Bypass
13	250	500		1468-00025	5W5T25	MO.5-325	1FM-325	Diode Filter
14	50	500		1468-00005	5W5Q5	MO.5-45	1FM-45	Osc. Grid Cap.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	GLOBE PART No.	IRC PART No.	CLAROSTAT PART No.	
15A	1 Meg.	½		D13-137	AM-63-Z	Volume Control
B	Shaft			E	KSS-3	Attach to 15A per instructions
C	Switch			42	SW-A2	" " " " "

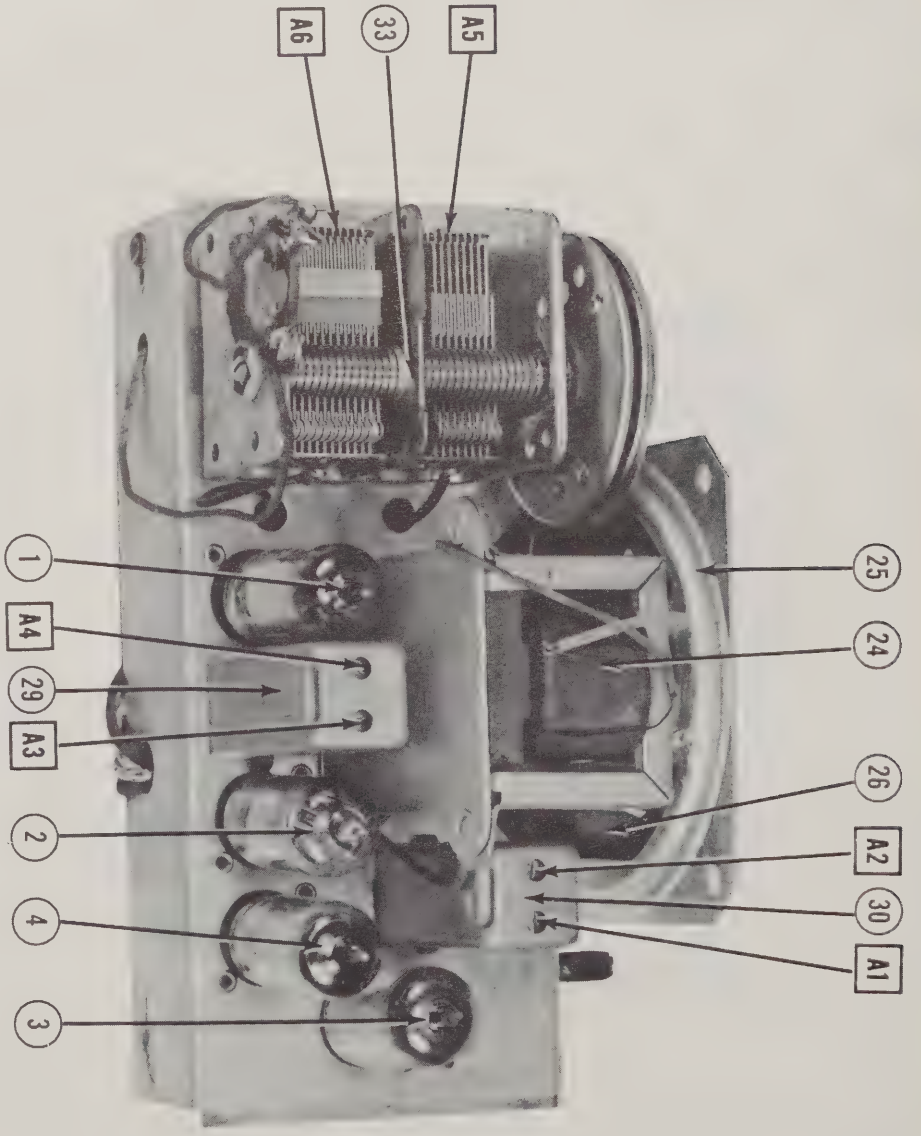
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	GLOBE PART No.	IRC PART No.	
16	110KΩ	½		BTS-100K	Br.-Br.-Yl. Oscillator Grid
17	10KΩ	½		BTS-10K	Br.-Blk.-Or. Screen Dropping
18	1.5 Meg.	½		BTS-1.5 Meg.	Br.-Grn.-Grn. AVC Network
19	5 Meg.	½		BTS-4.7 Meg.	Grn.-Blk.-Grn. AF Grid
20	5 Meg.	½		BTS-4.7 Meg.	Grn.-Blk.-Grn. AF Screen Dropping
21	1.5 Meg.	½		BTS-1.5 Meg.	Br.-Grn.-Grn. AF Plate Load
22	1.5 Meg.	½		BTS-1.5 Meg.	Br.-Grn.-Grn. Output Grid
23	500Ω	½		BTS-470	Grn.-Blk.-Br. Bias

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		GLOBE PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
24	9000Ω	4.5Ω	300Ω	.5Ω		A-3879	T22S47	A-2932	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			GLOBE PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	VC IMP.				
25	PM	4.5Ω			3A07	
	CONE DIA.	VC DIA.				
26	3-3/8"	1/2"				

R F COILS

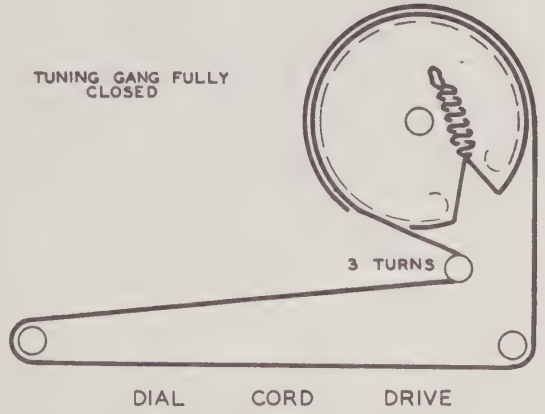
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	GLOBE PART No.	MEISSNER PART No.	
27	Loop Ant.		1.2Ω			
28	Osc. Coil	2.5Ω	5Ω		14-1060	
29	Input IF	18Ω	18Ω		16-6668	
30	Output IF	18Ω	18Ω		16-6669	

BATTERIES

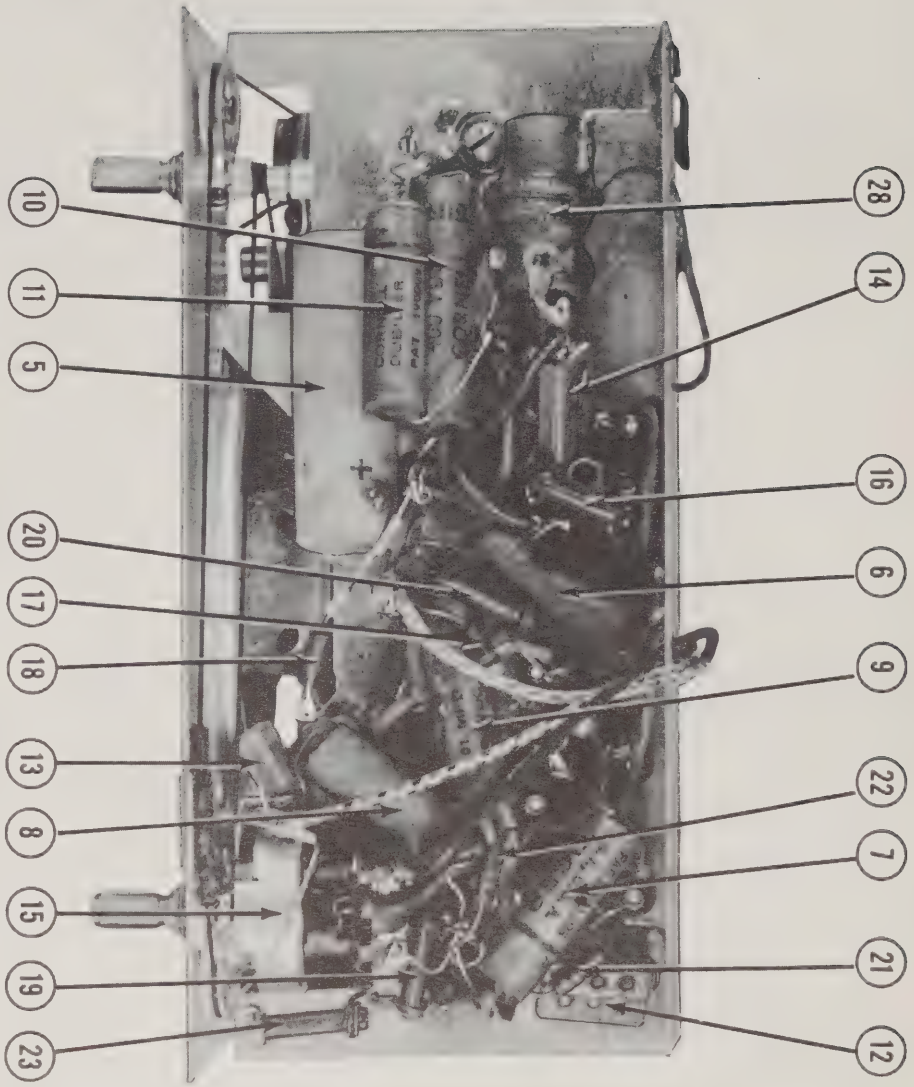
ITEM No.	VOLTAGE	GLOBE PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
31	1.5 V "A"		#950			2R			2 Used in parallel
32	67.5V "B"			#467			XX-45		

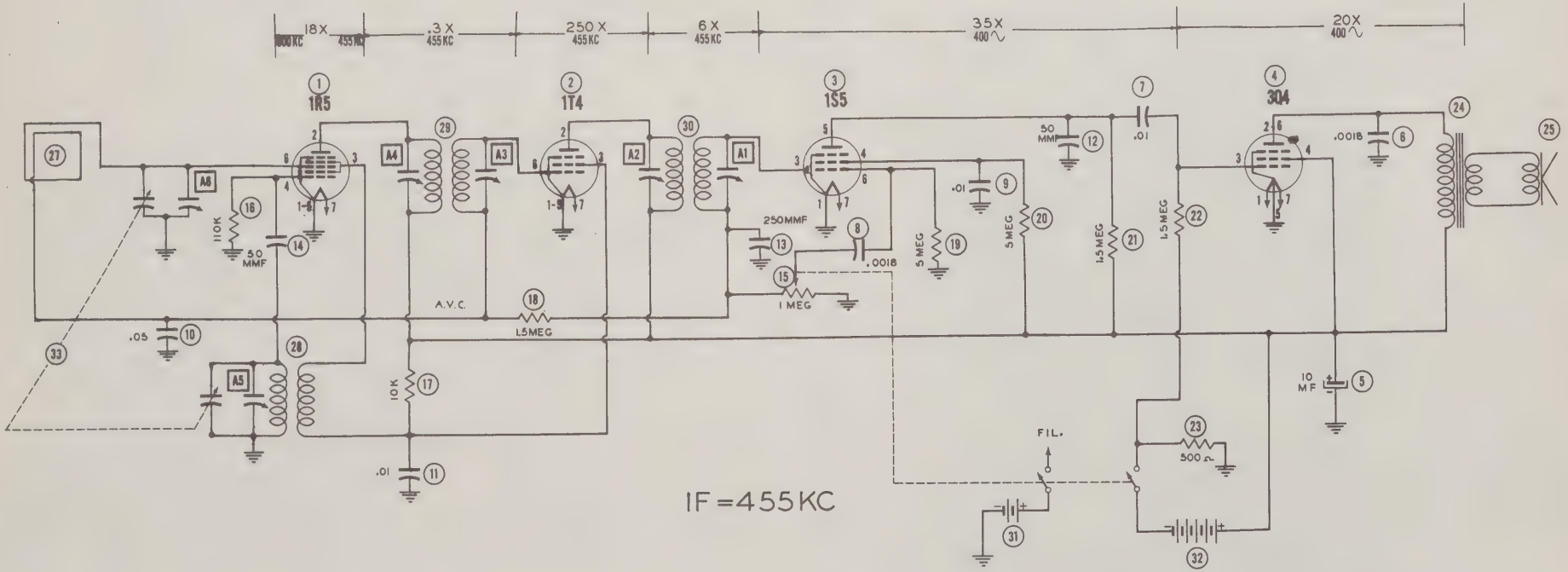
MISCELLANEOUS

ITEM No.	PART NAME	GLOBE PART No.	NOTES
33	2 Gang Var. Cap.		(16-406MMF, 31-177MMF)



CHASSIS—BOTTOM VIEW





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1R5	0V.	65VDC	42VDC	-3VDC	0V.	0V.	1.5VDC
2	1T4	0V.	65VDC	42VDC	7.5VDC	0V.	0V.	1.5VDC
3	1S5	0V.	0V.	0V.	7.5VDC	11VDC	0V.	1.5VDC
4	3Q4	1.5VDC	62VDC	-.8VDC	62VDC	0V.	62VDC	1.5VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1R5	*	100KΩ	110KΩ	110KΩ	*	2.5 Meg.	*
2	1T4	*	100KΩ	100KΩ	5 Meg.	*	2.5 Meg.	*
3	1S5	*	5 Meg.	1 Meg.	5 Meg.	1.6 Meg.	5 Meg.	*
4	3Q4	*	100KΩ	1.5 Meg.	100KΩ	*	100KΩ	*

*DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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4810-7

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by shorting AVC line to chassis.

1 - DC Voltage measurements are at 20,000 ohms per volts.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
5 - Volume control at maximum, no signal applied for voltage measurements.

HALLICRAFTERS
MODEL S-51

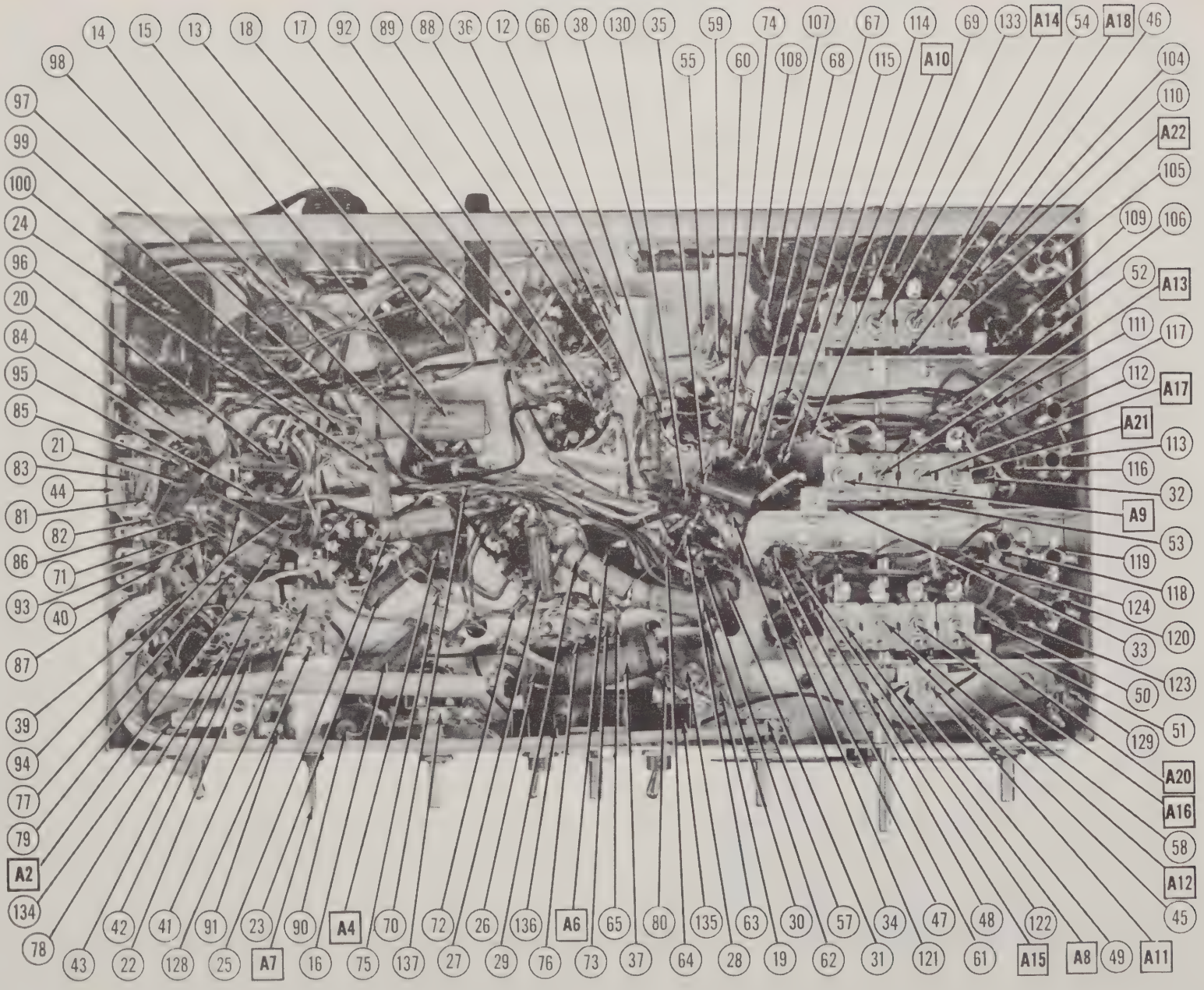
HALLICRAFTERS
MODEL S-51

HALLICRAFTERS MODEL S-51

TRADE NAME	Hallicrafters, Model S-51
MANUFACTURER	Hallicrafters Co., Fifth & Kostner, Chicago, Ill.
TYPE SET	AC-DC Operated Fixed Frequency and Multi-Band Superheterodyne Receiver
TUBES (TEN)	Types, 6SS7 RF Amp., 7A8 Converter, 6SS7 1st IF Amp., 6SS7 2nd IF Amp., 7C7 Det.-AVC-AF, 6SS7 BFO, 7A6 Noise Limiter, 6V6GT Power Output, 35L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	105-125 Volts AC-DC RATING .27 Amp. @ 117 Volts AC
SHORT WAVE -	RANGE A - 200-300KC Fixed Frequency, RANGE B - 2.0-3.0MC Fixed Frequency, RANGE C - 2.0-3.0MC Fixed Frequency, RANGE 1 - 132-405KC, RANGE 2 - 485-1530KC, RANGE 3 - 1450-4550KC, RANGE 4 - 4.2-13.0MC

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1948 by Howard W. Sams & Co., Inc., Indianapolis, Indiana, U. S. A. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America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98 55 60 108 68 115 A10 104
97 110
99 A22
100 105
24 109 106
96 52 A13
20 111 117
84 112 A17
95 A21
85 21 113
83 116
44 32
81 A9
82 53
86 119
71 118
93 124
40 120
87 33
50 123
39 129 51
94 A20
77 A16
79 58
A2 A12
134 45
78 42 41 91 23 90 A4 70 72 26 136 A6 65 80 135 63 30 57 34 47 48 122
43 22 128 25 A7 16 75 137 27 29 76 73 37 64 28 19 62 31 121 61 A15 A8 49 A11

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		HALLICRAFTERS PART No.	STANDARD REPLACEMENT		
1	RF Amp.	6SS7	6SS7	8N	
2	Converter	7A8	7A8	8U	
3	1st IF Amp.	6SS7	6SS7	8N	
4	2nd IF Amp.	6SS7	6SS7	8N	
5	Det.-AVC-AF	7C6	7C6	8W	
6	BFO	6SS7	6SS7	8N	
7	Noise Limiter	7A6	7A6	7AJ	
8	Power Output	6V6GT	6V6GT	7AC	Used on battery operation.
9	" "	35L6GT	35L6GT	7AC	Used on AC-DC line cord operation.
10	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	HALLICRAFTERS PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
11A	40	250	45B120		UP4445	DY-406	EL-240	Filter
B	40	250			"			"
C	30	250			BR3045			"
12	30	25				M-20-450	UT-30	Cathode Bypass
13	.05	600	46AY503F	684-05	DT6S5	ST-6-05	TC-15	Line Filter
14	.006	600	46AZ602J	684-006	DT6D6	ST-6-006	TC-26	Hash Filter
15	.25	400	46AW254J	484-.25	DT4P25	ST-4-25	TC-2	Line Isolation
16	.05	600	46AY503F	684-05	DT6S5	ST-6-05	TC-15	Tone Comp.
17	.003	600	46AZ302J	684-003	DT6D3	ST-6-003	TC-23	Output Plate Bypass
18	.02	400	46AW203J	484-02	DT4S2	ST-4-02	TC-12	Audio Coupling
19	.02	400	46AW203J	484-02	DT4S2	ST-4-02	TC-12	" "
20	.05	200	46AU503J	484-05	DT2S5	ST-4-05	TC-15	Limiter Filter
21	.02	200	46AU203J	484-02	DT2S2	ST-4-.02	TC-12	Audio Coupling
22	.01	400	46AW103J	484-01	DT4S1	ST-4-01	TC-11	BFO Bypass
23	.02	400	46AW203J	484-02	DT4S2	ST-4-02	TC-12	2nd IF Decoupling
24	.01	400	46AW103J	484-01	DT4S1	ST-4-01	TC-11	" " "
25	.02	400	46AW203J	484-02	DT4S2	ST-4-02	TC-12	AVC Filter
26	.02	400	46AW203J	484-02	DT4S2	ST-4-02	TC-12	1st IF Decoupling
27	.02	400	46AW203J	484-02	DT4S2	ST-4-02	TC-12	1st IF Cathode Bypass
28	.01	400	46AW103J	484-01	DT4S1	ST-4-01	TC-11	AVC Filter
29	.02	400	46AW203J	484-02	DT4S2	ST-4-02	TC-12	Converter Plate Decoup.
30	.02	400	46AW203J	484-02	DT4S2	ST-4-02	TC-12	Converter Screen Bypass
31	.02	400	46AW203J	484-02	DT4S2	ST-4-02	TC-12	Converter Cathode Bypass
32	.1	200	46AU104J	484-.1	DT2P1	ST-2-1	TC-1	Conv. Grid Filter
33	.01	400	46AW103J	484-01	DT4S1	ST-4-01	TC-11	" " "
34	.01	400	46AW103J	484-01	DT4S1	ST-4-01	TC-11	RF Decoupling
35	.02	400	46AW203J	484-02	DT4S2	ST-4-02	TC-12	RF Coupling
36	.02	400	46AW203J	484-02	DT4S2	ST-4-02	TC-12	RF Cathode Bypass
37	.25	200	46AT254J	484-.25	DT2P25	ST-2-25	TC-2	Sensitivity Cont. Bypass
38	.01	600	46AZ103J	684-01	DT6S1	S1-6-01	TC-11	Ext. Ground Isolation
39	220	500	CM20A221M	1468-00025	5W5T25	MO.5-325	1FM-325	AF Plate Bypass
40	1000	500	CM20A102M	1467-001	1W5D1	MO.3-21	1FM-21	Audio Coupling
41	470	500	CM20C471J					Fixed Trimmer
42	220	500	CM20A221M	1468-00025	5W5T25	MO.5-325	1FM-325	BFO Grid Cap.
43	220	500	CM20A221M	1468-00025	5W5T25	MO.5-325	1FM-325	Diode RF Filter
44	100	500	CM20A101M	1468-0001	5W5T1	MO.5-31	1FM-31	" " "
45	470	500	CM20A471J					Fixed Trimmer
46	150	500	CM20C151G					" "
47	1000	500	CM20A102M	1468-001	1W5D1	MO.3-21	1FM-21	Osc. Feedback
48	100	500	CM20A101M	1468-0001	5W5T1	MO.5-31	1FM-31	Osc. Grid Cap.
49	120	500	CM20A121J					Fixed Pad
50	3300	500	CM30A332K					" "
51	1500	500	CM30A152J	1464-0015	1R5D15	MWS.5-215		" "
52	5	500	47B20050M5	1468-000005	5W5V5	MO.5-55	MS-55	RF Coupling-Cer.
53	150	500	CM20C151G	1468-00015	5R5T15	MOS.5-315		Fixed Trimmer
54	5	500	47B20050M5	1468-000005	5W5V5	MO.5-55	MS-55	RF Coupling-Cer.
55	1000	500	CM20A102M	1468-001	1W5D1	MO.3-21	1FM-21	" "

DATE 5-28-48 #810-8
SET #40-FOLDER # 8

PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	HALLICRAFTER PART No.	IRC PART No.	CLAROSTAT PART No.	
57A	1 Meg.	½	25B583	D13-137	M-63-Z	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 57A per instructions
58A	10KΩ	½	25B582	D16-116	M-30-V	Sensitivity Control
B	Shaft		Not Req.	A	Not Req.	Attach to 58A per instructions

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	HALLICRAFTERS PART No.	IRC PART No.	
59	1 Meg.	½	RC20AE105K	BTS-1 Meg.	Br.-Blk.-Grn. RF Grid
60	270Ω	½	RC20AE271K	BW-½-270	Red-Vi.-Br. RF Cathode
61	10KΩ	½	RC20AE103M	BTS-10K	Br.-Blk.-Or. Parasitic Suppressor
62	47KΩ	½	RC20AE473M	BTS-47K	Yl.-Vi.-Or. Oscillator Grid
63	270Ω	½	RC20AE271K	BW-½-270	Red-Vi.-Br. Converter Cathode
64	6800Ω	½	RC20AE562M	BTS-6800	Blue-Gray-Red Converter Screen Decoupling
65	1000Ω	½	RC20AE102M	BTS-1000	Br.-Blk.-Red Converter Plate Decoupling
66	1000Ω	½	RC20AE102M	BTS-1000	Br.-Blk.-Red RF Plate Decoupling
67	100KΩ	½	RC20AE104M	BTS-100K	Br.-Blk.-Yl. Converter Grid
68	2200Ω	½	RC20AE222M	BTS-2200	Red-Red-Red " "
69	1000Ω	½	RC20AE102M	BTS-1000	Br.-Blk.-Red Parasitic Suppressor
70	100KΩ	½	RC20AE104M	BTS-100K	Br.-Blk.-Yl. AVC Network
71	2.2 Meg.	½	RC20AE225M	BTS-2.2 Meg.	Red-Red-Grn. " "
72	100Ω	½	RC20AE101M	BW-½-100	Br.-Blk.-Br. 1st IF Cathode
73	1000Ω	½	RC20AE102M	BTS-1000	Br.-Blk.-Red Decoupling
74	1500Ω	½	RC20AE152K	BTS-1500	Br.-Grn.-Red RF Plate Load
75	470Ω	½	RC20AE471M	BTS-470	Yl.-Vi.-Br. RF Plate Load-See Note 1
76	1000Ω	½	RC20AE102M	BTS-1000	Br.-Blk.-Red RF Plate Decoupling
77	47KΩ	½	RC20AE473M	BTS-47K	Yl.-Vi.-Or. Diode RF Filter
78	47KΩ	½	RC20AE473M	BTS-47K	Yl.-Vi.-Or. BFO Grid
79	15KΩ	½	RC20AE153M	BTS-15K	Br.-Grn.-Or. BFO Plate Load
80	150Ω	½	RC20AE151M	BW-½-150	Br.-Grn.-Br. AVC Shunt
81	330KΩ	½	RC20AE334M	BTS-330K	Or.-Or.-Yl. Diode Load
82	100KΩ	½	RC20AE104M	BTS-100K	Br.-Blk.-Yl. " "
83	1 Meg.	½	RC20AE105M	BTS-1 Meg.	Br.-Blk.-Grn. AVC Network
84	470KΩ	½	RC20AE474M	BTS-470K	Yl.-Vi.-Yl. Noise Limiter Network
85	2.2 Meg.	½	RC20AE225M	BTS-2.2 Meg.	Red-Red-Grn. Noise Limiter Diode Load
86	10 Meg.	½	RC20AE106M	BTS-10 Meg.	Br.-Blk.-Blue AF Grid
87	330KΩ	½	RC20AE334M	BTS-330K	Or.-Or.-Yl. AF Plate Load
88	470KΩ	½	RC20AE474M	BTS-470K	Yl.-Vi.-Yl. Output Grid
89	150Ω	½	RC20AE151M	BW-½-150	Br.-Grn.-Br. Output Cathode
90	4700Ω	2	RC40AE472K	BT-2-4700	Yl.-Vi.-Red Tone Compensation
91	100Ω	1	RC30AE101M	BW-1-100	Br.-Blk.-Br. Headphone Shunt
92	150Ω	½	RC20AE151M	BW-½-150	Br.-Grn.-Br. Output Cathode
93	15Ω	1	RC20AE150M	BW-1-15	Br.-Grn.-Blk. Series Filament
94	220Ω	2	RC40AE223M	BW-2-220	Red-Red-Br. Filament Shunt-See Note 2
95	330Ω	½	RC20AE331M	BW-½-330	Or.-Or.-Br. Pilot Light Shunt
96	15Ω	1	RC30AE150M	BW-1-15	Br.-Grn.-Blk. Surge Limiter
97	7500Ω	5	24B752E	AB-7500	Bleeder
98	2200Ω	½	RC20AE222M	BTS-2200	Red-Red-Red Filter
99	150KΩ	½	RC20AE154M	BTS-150K	Br.-Grn.-Yl. Line Isolation

Note 1-Some models use two 1000Ω in parallel.
Note 2-Some models use two 100Ω 1 Watt in series.

FILTER CHOKE

ITEM NO.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∿)	HALLICRAFT. PART NO.	STANCOR PART NO.	THORDARSON PART NO.	MERIT PART No.	
100	.06	190Ω	3.2 Henries	56B002		T-20653-X		

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		HALLICRAFT. PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
101	5400Ω tapped @ 2500Ω	100Ω tapped @ 3.8Ω	370Ω tapped @ 250Ω	32Ω tapped @ .6Ω	55B106				

PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: HALLICRAFTERS PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	VC IMP.				
102	PM	3.8Ω				
	CONE DIA.	VC DIA.				
103	4-5/8"	1/2"				

R F COILS

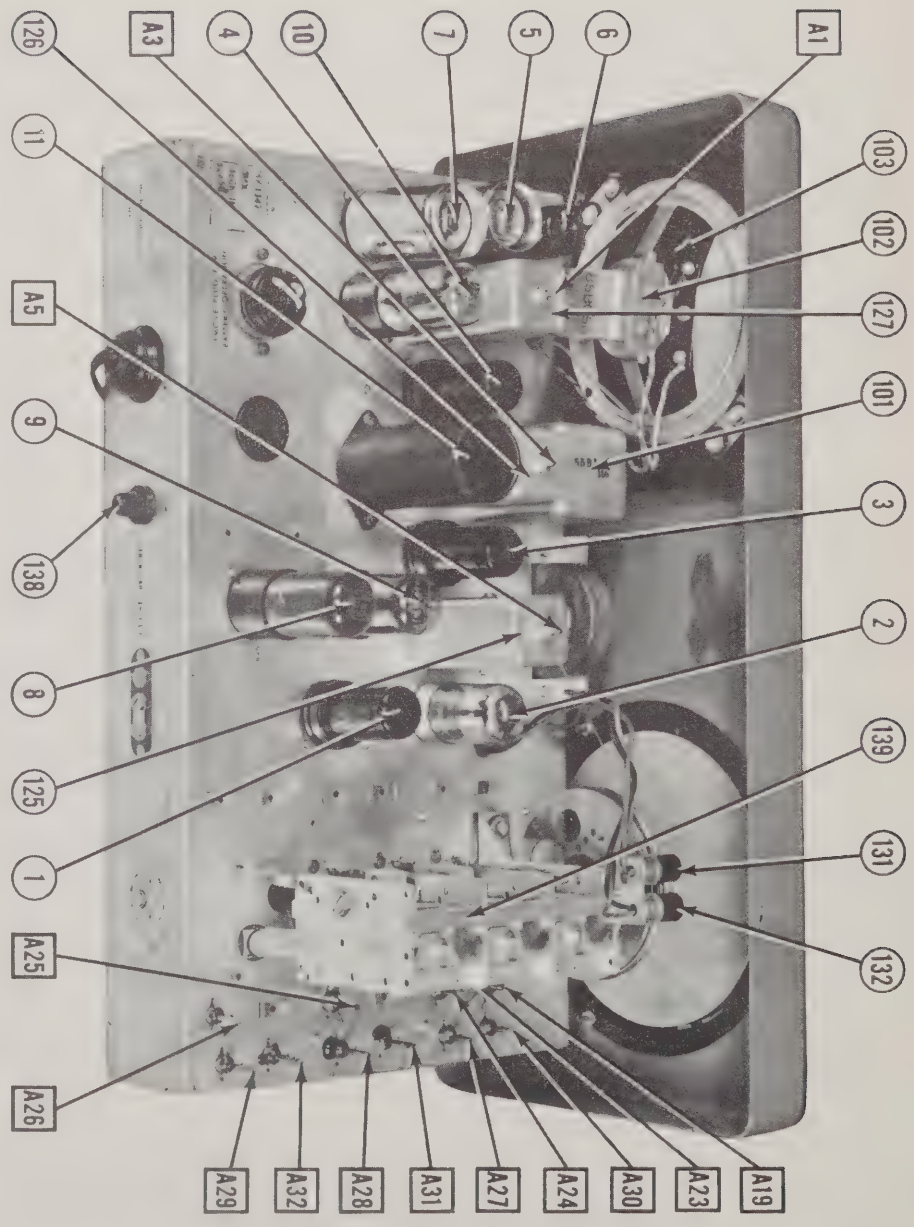
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: HALLICRAFTER PART No.	REPLACEMENT DATA: MEISSNER PART No.
104	Ant. Coil A	105Ω	19Ω	51B1008	
105	" " B	1.3Ω	.4Ω	51B1016	
106	" " C	1.3Ω	.4Ω	51B1016	
107	" " 1	140Ω	42Ω	51B1007	
108	" " 2	42Ω	9Ω	51B1006	
109	" " 3	14Ω	3.5Ω	51B1005	
110	" " 4	.3Ω	0Ω	51B1004	
111	" " A	19Ω	2.7Ω	51B1008	
112	" " B	1.6Ω	.1Ω	51B1017	
113	" " C	1.8Ω	.1Ω	51B1017	
114	" " 1	39Ω	2Ω	51B1003	
115	" " 2	8Ω	2.5Ω	51B1002	
116	" " 3	3Ω	1.2Ω	51B1001	
117	" " 4	9Ω	.1Ω	51B1000	
118	Osc. Coil A	2.2Ω	2.4Ω	51B1010	
119	" " B	.2Ω	1.2Ω	51B1013	
120	" " C	.2Ω	1.2Ω	51B1013	
121	" " 1	8Ω	20Ω	51B099	
122	" " 2	1.2Ω	3.5Ω	51B998	
123	" " 3	.7Ω	1.2Ω	51B997	
124	" " 4	.1Ω	.6Ω	51B996	
125	Input IF	8Ω	1.5Ω	50C222	
126	Inter. IF	8Ω	1.5Ω	50C223	
127	Output IF	6.5Ω	6.5Ω	50C224	
128	BFO Trans.	14Ω		54B033-1	
129	RF Choke	43Ω		53B005	
130	" "	60Ω		53A121	

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: HALLICRAFTERS PART No.		INSTALLATION NOTES
131-132	Bayonet	6-8	0.15	Brown	39A004		Type 47

MISCELLANEOUS

ITEM No.	PART NAME	HALLICRAFTERS PART No.	NOTES
	Ant. Wafer	60B314	2 Section
	RF Wafer	60B313	" "
133	Osc. Wafer	60B313	" "
	Shaft & Detent Plate	74A239	
134	Switch	60A102-3	Standby-Receive
135	"	60A192	CW-AM
136	"	60A138-3	Noise Limiter
137	"	60B311	On-Off-Tone
138	Fuse	39A306	1 Amp.
139	3 Gang Var. Cap.	48C194	(12-506 MMF) each section
All	Padder	44B231	Band 1 Osc. Adj.
A15	"	44B230	Band 2 " "
	Osc. Trimmer Strip	44B352	A8,A12,A16,A20
	RF Trimmer Strip	44B227	A9,A13,A17,A21
	Ant. Trimmer Strip	44B228	A10,A14,A18,A22



ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low frequency end of dial.

Bands A, B & C are preset as follows: Band A - 278KC (Airport control tower frequency), Band B - 2670KC (Coast Guard frequency), Band C - 2738KC (Ship to ship or ship to shore). If these frequencies are not desired they may be changed as in Steps 15, 16 & 17 below.

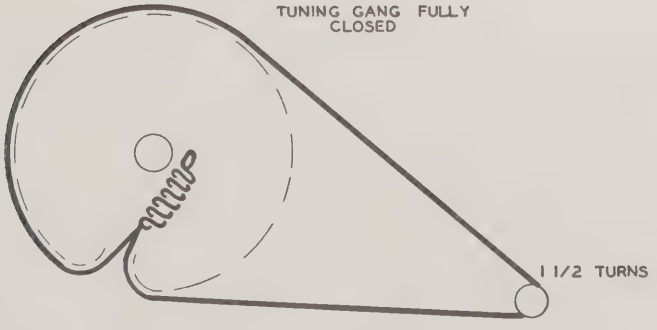
RMA Dummy Antenna consists of 200 MMFD. cap. in series with 20 μH coil, with the coil shunted by 400 MMFD. in series with 400Ω carbon resistor.

Use isolation transformer if available. If not, connect a .1 MFD capacitor in series with low side of signal generator and chassis.

Controls should be set as follows: Sensitivity at full clockwise rotation, Volume control at full clockwise rotation, CW-AM switch at "AM", Noise Limiter switch at "OFF", Tone switch at "HIGH", Pitch control at "ZERO", Standby Receive switch at "RECEIVE".

Use only enough signal from signal generator to obtain an output reading. Use insulated alignment screwdriver for all adjustments.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to center stator of tuning cap. Low side to B-.	445KC	2	Tuning cap. fully open.	Across voice coil	A1, A2, A3, A4, A5, A6.	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD. to reduce hum modulation.
2	.1 MFD.	"	445KC (Unmodulated)	"	"	"	A7	Remove pitch control knob and adjust A7 for approx. 1000 ∿ beat note.
3	RMA DUMMY	High side to ant. terminal A1. Low side to A2 with link connected.	350KC	1	350KC	"	A8	Adjust for maximum output.
4	"	"	"	"	Tune for maximum output.	"	A9, A10	" " " "
5	"	"	150KC	"	"	"	A11	Rock tuning cap. and adjust for maximum output. Repeat Steps 3, 4 & 5 until no further improvement can be made.
6	"	"	1400KC	2	1400KC	"	A12	Adjust for maximum output.
7	"	"	"	"	Tune for maximum output.	"	A13, A14.	" " " "
8	"	"	600KC	"	"	"	A15	Rock tuning cap. and adjust for maximum output. Repeat Steps 6, 7 & 8 until no further improvement can be made.
9	"	"	4MC	3	4MC	"	A16	Adjust for maximum output.
10	"	"	"	"	Tune for maximum output.	"	A17, A18.	Rock tuning cap. and adjust for maximum output.
11	"	"	1600KC	"	"	"	A19	Rock tuning cap. and adjust for maximum output. Repeat Steps 9, 10 & 11 until no further improvement can be made.
12	"	"	12MC	"	12MC	"	A20	Adjust for maximum output.
13	"	"	"	"	Tune for maximum output.	"	A21, A22	Rock tuning cap. and adjust for maximum output.
14	"	"	5MC	"	"	"	A23	Rock tuning cap. and adjust for maximum output. Repeat Steps 12, 13 & 14 until no further improvement can be made.
15	"	"	200-300KC	A	-	"	A24, A25 A26	Adjust for maximum output. See prealignment notes.
16	"	"	2-3MC	B	-	"	A27, A28 A29	"
17	"	"	"	C	-	"	A30, A31, A32	"



DIAL CORD DRIVE

PARTS LIST AND DESCRIPTIONS

6 VOLT

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	HALLICRAFTERS PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
1	100	25	45A116	PRS25/100	BRH251	M-100-25	UHC-102	Hash Filter
2	.5	120	46A139	484-.5	DT2P5	SHH-1	TC-5	" "
3	.01	1600	46A008-2	1689-01	MD16S1	STM-16-01	TR-11	Buffer
4	.25	400	46AW254J	484-.25	DT4P25	ST-4-25	TC-2	Hash Filter
5	.05	200	46A091	484-05	DT5S5	ST-4-05	TC-15	" " *

*Not used in all units.

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	HALLICRAFTERS PART No.	IRC PART No.	
6	100Ω	1	RC30AE101K	BW-1-100	Br.-Blk.-Br. Hash Suppression
7	100Ω	1	RC30AE101K	BW-1-100	Br.-Blk.-Br. " "
8	5600Ω	½	RC20AE562K	BTS-5600	Grn.-Blue-Red " "

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA		INSTALLATION NOTES
				HALLICRAFT. PART No.	RADIART PART No.	
9	Synchronous	6V. DC	115∿	27B143		

TRANSFORMER (VIBRATOR)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	HALLICRAFT. PART No.	STANCOR PART No.	THORDARSON PART No.	
10	6V DC @ 2.6A	300V CT @ .06A			52C158-0			

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	HALLICRAFT. PART No.	MEISSNER PART No.	
11	RF Choke Coil	41.2Ω		53H005		
12	Hash Choke Coil	0Ω		53A022		
13	Hash Choke Coil	0Ω		53A100		

12 VOLT

CAPACITORS

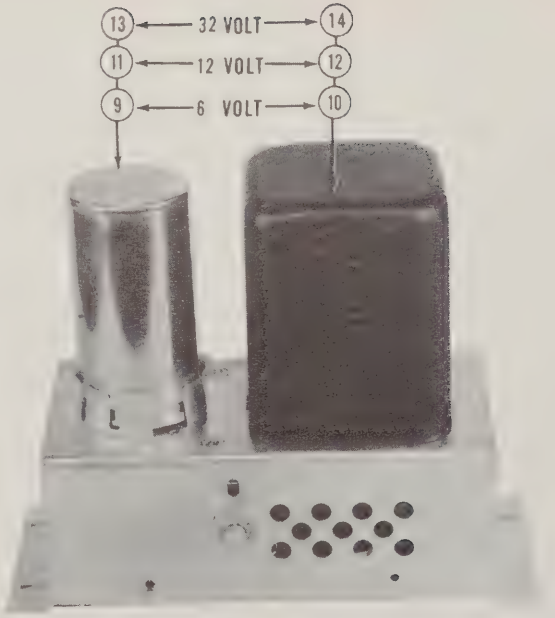
Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

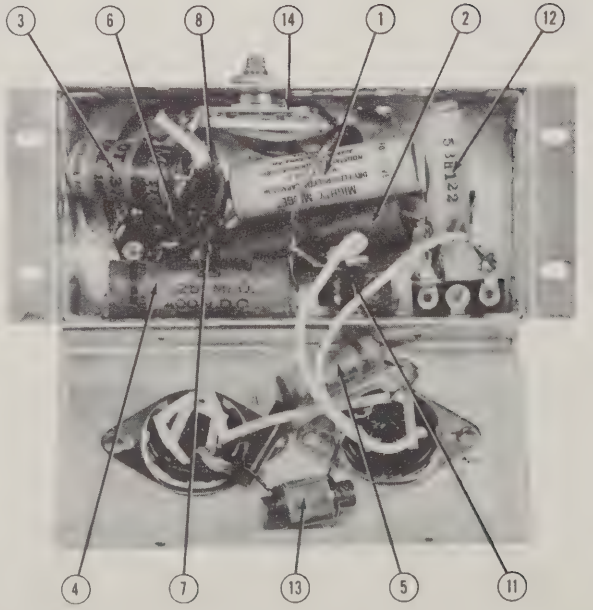
ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	HALLICRAFTERS PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
1	100	25	45A116	PRS25/100	BRH251	M-100-25	UHC-102	Hash Filter
2	.5	120	46A139	484-.5	DT2P5	SHH-1	TC-5	" "
3	.007	1600	46A008-4	1689-007	MD-16D7	STM-16-007	TR-27	Buffer
4	.25	400	46AW254J	484-.25	DT4P25	ST-4-25	TC-2	Hash Filter
5	100	300	47A045	1468-0001	5W5T1	MO.5-31	1FM-31	RF Bypass-Cer. *

*Not used in all units.

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	HALLICRAFTER PART No.	IRC PART No.	
6	4700Ω	½	RC20AE472K	BTS-4700	Yl.-Vl.-Red Hash Suppression
7	330Ω	1	RC30AE331K	BW-1-330	Or.-Or.-Br. " "
8	330Ω	1	RC30AE331K	BW-1-330	Or.-Or.-Br. " "
9	39Ω	2	RC40AE390K	BW-2-39	Or.-White-Blk. Filament Shunt
10	20Ω	5	24B20CE	AB-20	Series Pilot Light





6 VOLT SUPPLY

PARTS LIST AND DESCRIPTIONS (Continued)

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA: HALLICRAFT. PART No.	RADIART PART No.	INSTALLATION NOTES
11	Synchronous	12 VDC	115 ∿	27B144		

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	SEC. 1	SEC. 2	SEC. 3	REPLACEMENT DATA: HALLICRAFTERS PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
12	117 V AC @ 1.5A	350 V CT @ .060A			52C159-0			

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: HALLICRAFTERS PART No.	MEISSNER PART No.
13	RF Choke	41.2Ω		53B005	
14	Hash Choke	0Ω		53A122	

32 VOLT CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	VOLT	REPLACEMENT DATA: HALLICRAFTERS PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
1	100	50	45A115	PRS50/100	BRH251	M-100-50	UHC-102	Hash Filter
2	.5	120	46A139	484-.5	DT4P5	SHH-1	TC-5	" "
3	.006	1600	46A055	1689-006	MD16D6	STM-16-006	TR-26	Buffer
4	.25	400	46AW254J	484-.25	DT4P25	ST-4-25	TC-2	Hash Filter
5	100	300	47A045	1468-0001	5W5T1	MO.5-31	1FM-31	RF Bypass*-Cer.
6	100	300	47A045	1468-0001	5W5T1	MO.5-31	1FM-31	" " *- "

*Not used in all units.

RESISTORS

ITEM No.	RATING: RESISTANCE	WATTS	REPLACEMENT DATA: HALLICRAFTER PART No.	IRC PART No.	IDENTIFICATION CODES
7	2200Ω	½	RC20AE222K	BTS-2200	Red-Red-Red Hash Suppression
8	2700Ω	1	RC30AE272K	BTA-2700	Red-Vi.-Red " "
9	2700Ω	1	RC30AE272K	BTA-2700	Red-Vi.-Red " "
10	40Ω	5	24BF400E	AB-400	Filament Shunt
11	170Ω	5	24BF171E	ABA-220	Series Pilot Light-See Note
12	30Ω	10	24BG300E	AB-30	Series Filament

Note-On IRC replacement set slider 170Ω from one end.

VIBRATOR

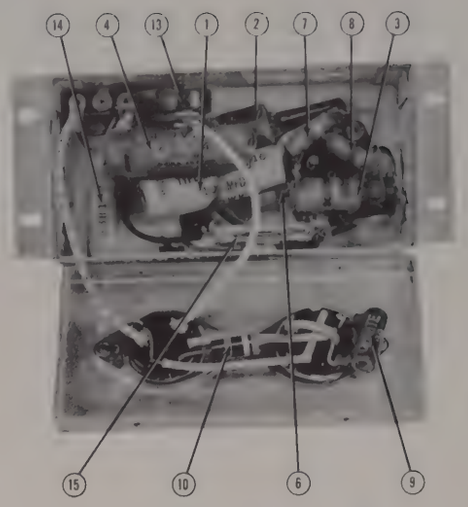
ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA: HALLICRAFT. PART No.	RADIART PART No.	INSTALLATION NOTES
13	Synchronous	32 VDC	115 ∿	27B145		

TRANSFORMER (VIBRATOR)

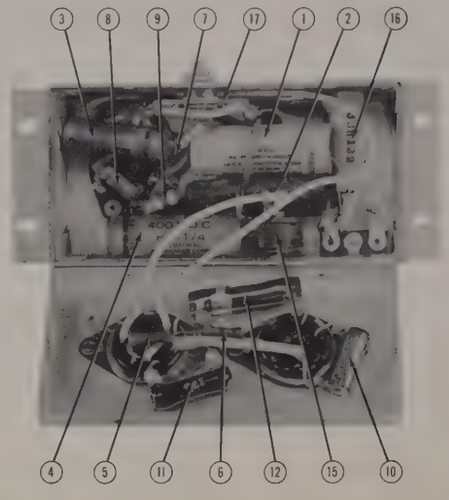
ITEM No.	RATING: PRI.	SEC. 1	SEC. 2	SEC. 3	REPLACEMENT DATA: HALLICRAFTERS PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
14	32V DC @ .36A	350V CT @ .066A			52C160-0			

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: HALLICRAFTERS PART No.	MEISSNER PART No.
15	RF Choke	41.2Ω		53B005	
16	Hash Choke	0Ω		53A122	



12 VOLT SUPPLY



32 VOLT SUPPLY

VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6S87	0V.	21VAC	3VDC	0V.	3VDC	92VDC	27VAC	95VDC
2	7A8	1.3VAC	100VDC	90VDC	-1VDC$	77VDC	0V.	2VDC	21VAC
3	6S87	0V.	27VAC	0V.	0V.	2VDC	90VDC	34VAC	90VDC
4	6S87	0V.	34VAC	3.8VDC	0V.	3.8VDC	84VDC	41VAC	85VDC
5	7C6	0V.	63VDC	-.6VDC	0V.	-.6VDC	0V.	0V.	7VAC
6	6S87	0V.	46VAC	47VDC	-6VDC$	0V.	47VDC	41VAC	47VDC
7	7A6	11VAC	0V.	0V.	0V.	0V.	0V.	0V.	7VAC
8	6V6GT	0V.	6.2VDC	130VDC	135VDC	0V.	0V.	0V.	6.6VDC
9	35L6GT	0V.	46VAC	95VDC	102VDC	0V.	0V.	86VAC	6VDC
10	35Z5GT	0V.	117VAC	115VAC	115VDC	113VAC	0V.	86VAC	115VDC

‡‡VOLTAGE AND RESISTANCE READINGS TAKEN WITH CW-AM SWITCH IN CW.
**VOLTAGE AND RESISTANCE READINGS TAKEN USING 6 VOLT VIBRAPACK.
AM-CW SWITCH IN AM POSITION.
NOISE LIMITER SWITCH ON.
SENSITIVITY CONTROL AT MAXIMUM SENSITIVITY.

$TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

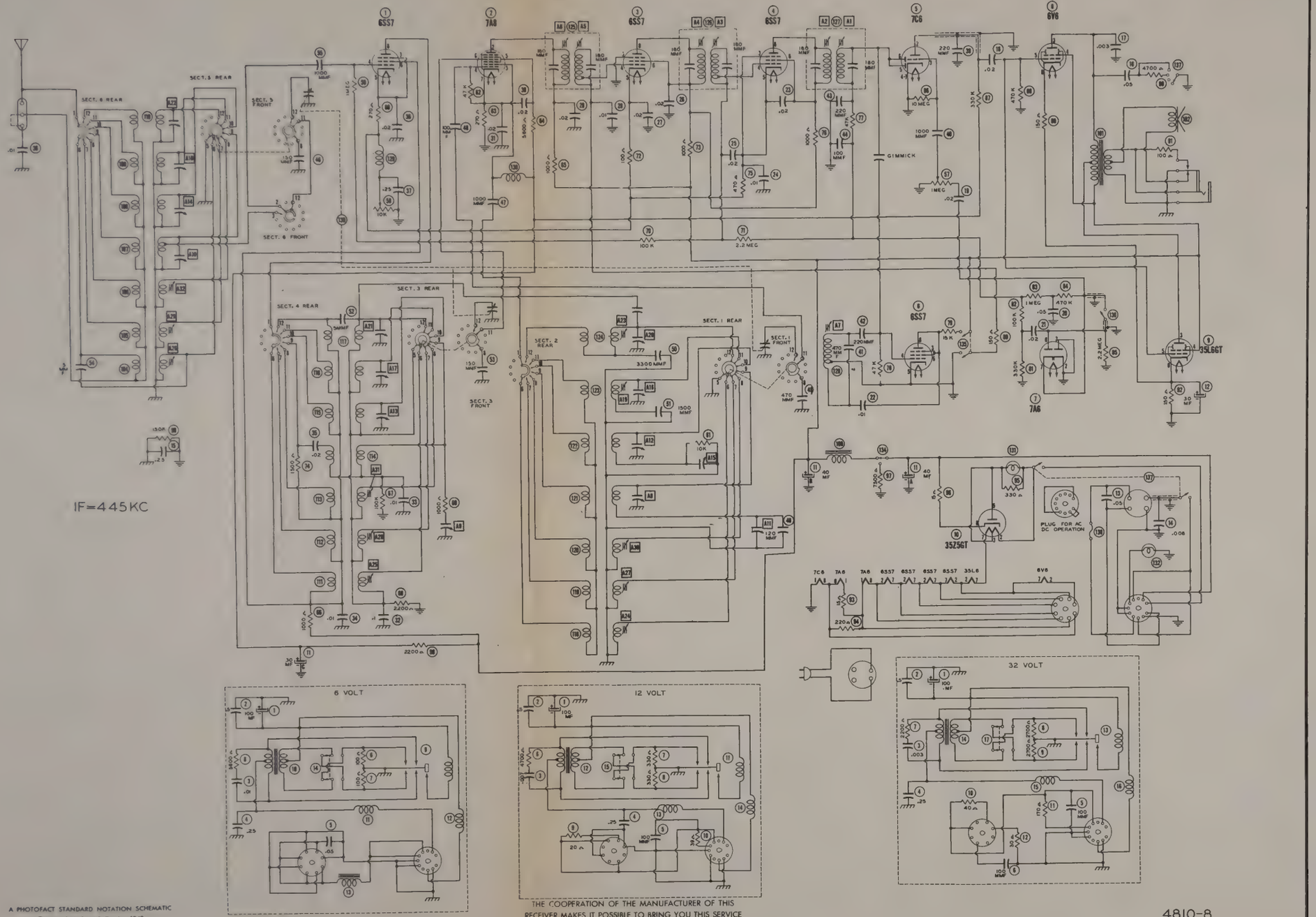
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6S87	150KΩ	34Ω	320Ω	4 Meg.	320Ω	400Ω	40Ω	400KΩ
2	7A8	26Ω	400KΩ	400KΩ	47KΩ	400KΩ	2.2KΩ	270Ω	34Ω
3	6S87	150KΩ	40Ω	0Ω	3 Meg.	150Ω	400KΩ	47Ω	400KΩ
4	6S87	150KΩ	47Ω	520Ω	3 Meg.	520Ω	400KΩ	54Ω	400KΩ
5	7C6	0Ω	730KΩ	10 Meg.	0Ω	500KΩ	500KΩ	0Ω	8Ω
6 ‡‡	6S87	150KΩ	60Ω	415KΩ	47KΩ	0Ω	415KΩ	54Ω	415KΩ
7	7A6	13Ω	0Ω	0Ω	0Ω	0Ω	2.2 Meg.	1.9 Meg.	8Ω
8 **	6V6GT	150KΩ	.5Ω	400KΩ	400KΩ	470KΩ	0Ω	0Ω	300Ω
9	35L6GT	0Ω	60Ω	400KΩ	400KΩ	470KΩ	0Ω	92Ω	150Ω
10	35Z5GT	INF.	120Ω	122Ω	410KΩ	122Ω	7.5KΩ	92Ω	400KΩ

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

STAGE GAIN MEASUREMENTS

ANTENNA TO RF GRID		3X	600KC
RF GRID TO CONVERTER GRID		2.5X	600KC
CONVERTER GAIN		50X	IN 600KC OUT 445KC
INPUT IF TRANS.		.15X	445KC
1st IF TUBE		85X	445KC
INTER. IF TRANS.		.3X	445KC
2nd IF TUBE		200X	445KC
OUTPUT IF TRANS.		1X	445KC
AUDIO		40X	400 ∿
OUTPUT			400 ∿
	14X		

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce many variables into the measurement operation, such as improper use of voltmeter, handling, etc., that an absolute reading is impractical. AVC is made inoperative by placement of probes, the accuracy or alignment, connecting negative (-) 3 volts to the AVC line.



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

4810-8

KNIGHT MODEL 4D-450
BATTERY OPERATED

KNIGHT MODEL 4D-450
BATTERY OPERATED

KNIGHT MODEL 4D-450

TRADE NAME	Knight, Model 4D-450
SUPPLIER	Allied Radio Corp., 833 W. Jackson Blvd., Chicago 7, Ill.
TYPE SET	Battery Operated Portable Superheterodyne Receiver with Loop Antenna
TUBES (FOUR)	Types, 1R5 Converter, 1U4 IF Amp., 1S5 Det.-AVC-AF, 3S4 Power Output.
POWER SUPPLY RATING	1.5 Volts "A" Supply and 67.5 Volts "B" Supply 245MA @ 1.5 Volts DC and 8.6MA @ 67.5 Volts DC
TUNING RANGE—BROADCAST	540-1700KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position, output or signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to rear stator of tuning cap. Low side to chassis.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output.
2		Loop	1700KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	1500KC	Tune for maximum output.	"	A6	Adjust for maximum output.

HOWARD W. SAMS & CO., INC. **Indianapolis Indiana**

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PARTS LIST AND DESCRIPTIONS

KNIGHT MODEL 4D-450
BATTERY OPERATED

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: KNIGHT PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	1R5	1R5	7AT	
2	IF Amp.	1U4	1U4	6AR	
3	Det.-AVC-AF	1S5	1S5	6AU	
4	Power Output	3S4	3S4	7BA	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: KNIGHT PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
5A	20	150		PRS150-20	BR2015	M-20-150	UT-201	Battery Bypass
B	16	100	CE-14	PRS150-16	BR1615	M-16-150	UT-161	Alternate Battery Bypass
6	.005	600	CP-502-1	684-005	DT6D5	ST-6-005	TC-25	Output Plate Bypass
7	.002	600	CP-202-2	684-002	DT6D2	ST-6-002	TC-22	Audio Coupling
8	.01	200	CP-103-3	484-01	DT2S1	ST-4-01	TC-11	AF Screen Bypass
9	.001	600	CP-102-3	684-001	DT6D1	ST-6-001	TC-21	Audio Coupling
10	.01	200	CP-103-3	484-01	DT2S1	ST-4-01	TC-11	Conv. Decoupling
11	.05	200	CP-503-4	484-05	DT2S5	ST-4-05	TC-15	AVC Filter
12	100	500	CM-101-2	1468-0001	5W5T1	M0.5-31	1FM-31	AF Plate Bypass-Cer.
13	100	500	CM-101-2	1468-0001	5W5T1	M0.5-31	1FM-31	Diode RF Filter-Cer.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: KNIGHT PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
14	1 Meg.	½	VC-6			Volume Control & Sw.

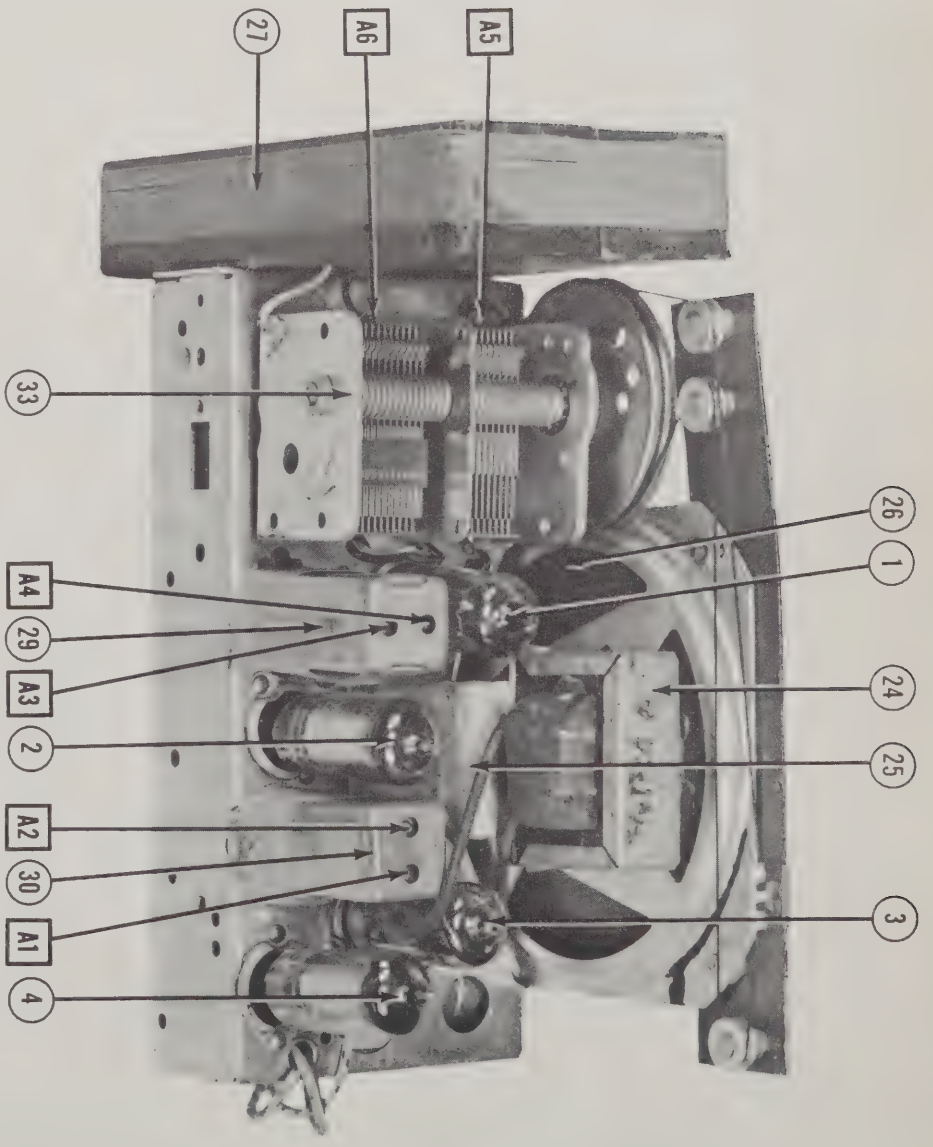
RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: KNIGHT PART No.	IRC PART No.	IDENTIFICATION CODES
15	100KΩ	½	RC-104-1	BTS-100K	Br.-Blk.-Yl. Oscillator Grid
16	15KΩ	½	RC-153-1	BTS-15K	Br.-Grn.-Or. Converter Decoupling
17	3.3 Meg.	½	RC-335-1	BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
18	2.2 Meg.	½	RC-225-1	BTS-2.2 Meg.	Red-Red-Grn. 1st IF Transformer Shunt
19	10 Meg.	½	RC-106-1	BTS-10 Meg.	Br.-Blk.-Blue AF Grid
20	3.3 Meg.	½	RC-335-1	BTS-3.3 Meg.	Or.-Or.-Grn. AF Screen Dropping
21	1 Meg.	½	RC-105-1	BTS-1 Meg.	Br.-Blk.-Grn. AF Plate Load
22	2.2 Meg.	½	RC-225-1	BTS-2.2 Meg.	Red-Red-Grn. Output Grid
23	820Ω	½	RC-821-2	BTS-820	Gray-Red-Br. Bias

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: KNIGHT PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	INSTALLATION NOTES
24	7000Ω	3.6Ω	360Ω	.6Ω	Part of SP-41-7	A-3878*	T22347*	A-2931*	*Bend mounting tabs down, file out slots and mount on original bracket.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: KNIGHT PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	VC IMP.				
25	PM	3.6Ω	SP-41-7		4Alt	†Drill new mounting holes and trim flange.
	CONE DIA.	VC DIA.				
26	4"	1/2"	NOT READILY REPLACEABLE-USE COMPLETE SPEAKER UNIT			

R F COILS

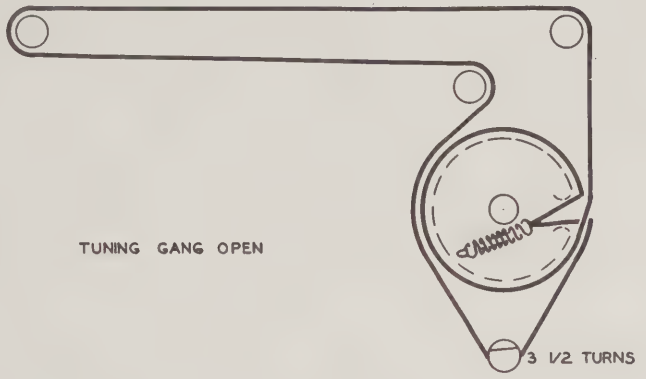
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: KNIGHT PART No.	MEISSNER PART No.	
27	Loop Ant.		.3Ω	LP6		
28	Osc. Coil	2.5Ω	6.5Ω	LC4	14-1040‡	‡Add 50 MMFD from osc. grid to high side tuning cap.
29	Input IF	17.5Ω	21.5Ω	LF22	16-6678	
30	Output IF	17.5Ω	21.5Ω	LF22	16-6678	

BATTERIES

ITEM No.	VOLTAGE	KNIGHT PART No.	REPLACEMENT DATA: EVEREADY "A"	EVEREADY "B"	EVEREADY "A-B"	BURGESS "A"	BURGESS "B"	BURGESS "A-B"	INSTALLATION NOTES
31	1.5V "A"		#950			#2R			3 Used in Parallel
32	67.5V"B"			#467			#XX-45		

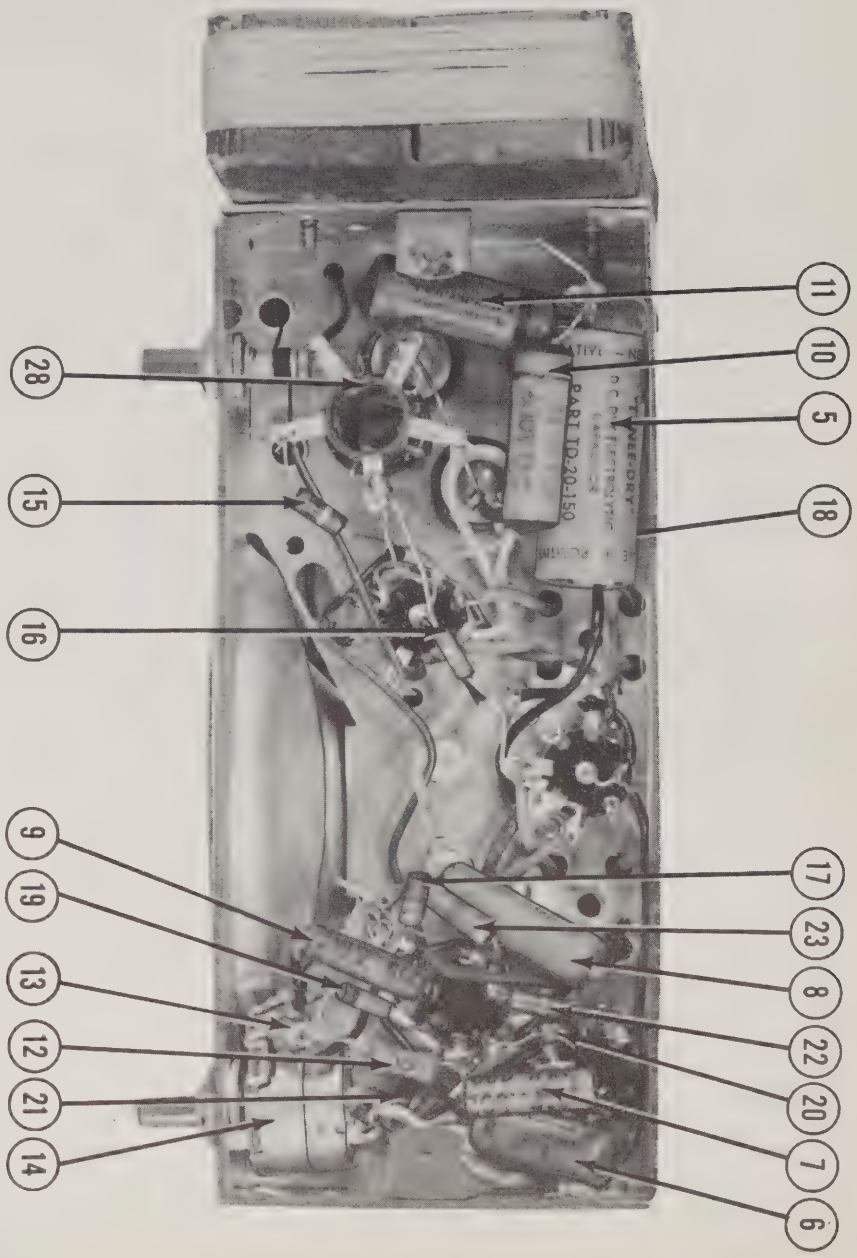
MISCELLANEOUS

ITEM No.	PART NAME	KNIGHT PART No.	NOTES
33	2 Gang Var. Cap.	CV10	(27-475MMF, 18-164MMF)
	Dial Pointer	PN6	

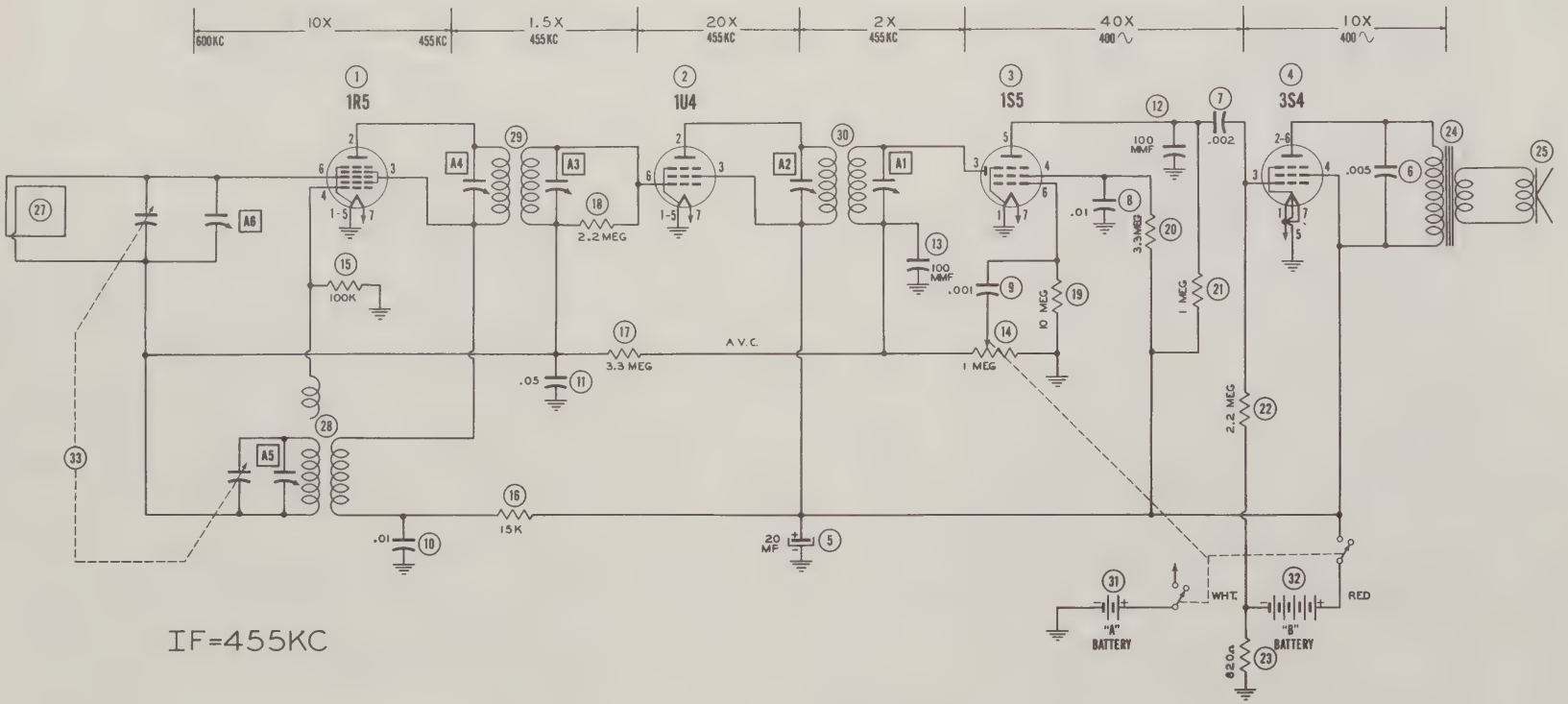


DIAL CORD DRIVE

CHASSIS—BOTTOM VIEW



KNIGHT MODEL 4D-450 BATTERY OPERATED



IF=455KC

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1R5	0V.	32VDC	32VDC	-11VDC§	0V.	0V.	1.4VDC
2	1U4	0V.	62VDC	62VDC	0V.	0V.	0V.	1.4VDC
3	1S5	0V.	-7VDC	0V.	11VDC	9VDC	0V.	1.4VDC
4	3S4	1.4VDC	59VDC	-1VDC	62VDC	0V.	59VDC	1.4VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1R5	*	1 Meg.	1 Meg.	100KΩ	*	5 Meg.	*
2	1U4	*	1 Meg.	1 Meg.	INF.	*	5 Meg.	*
3	1S5	*	750Ω	1 Meg.	4.3 Meg.	2 Meg.	10 Meg.	*
4	3S4	*	1 Meg.	2.2 Meg.	1 Meg.	*	1 Meg.	*

*DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE.

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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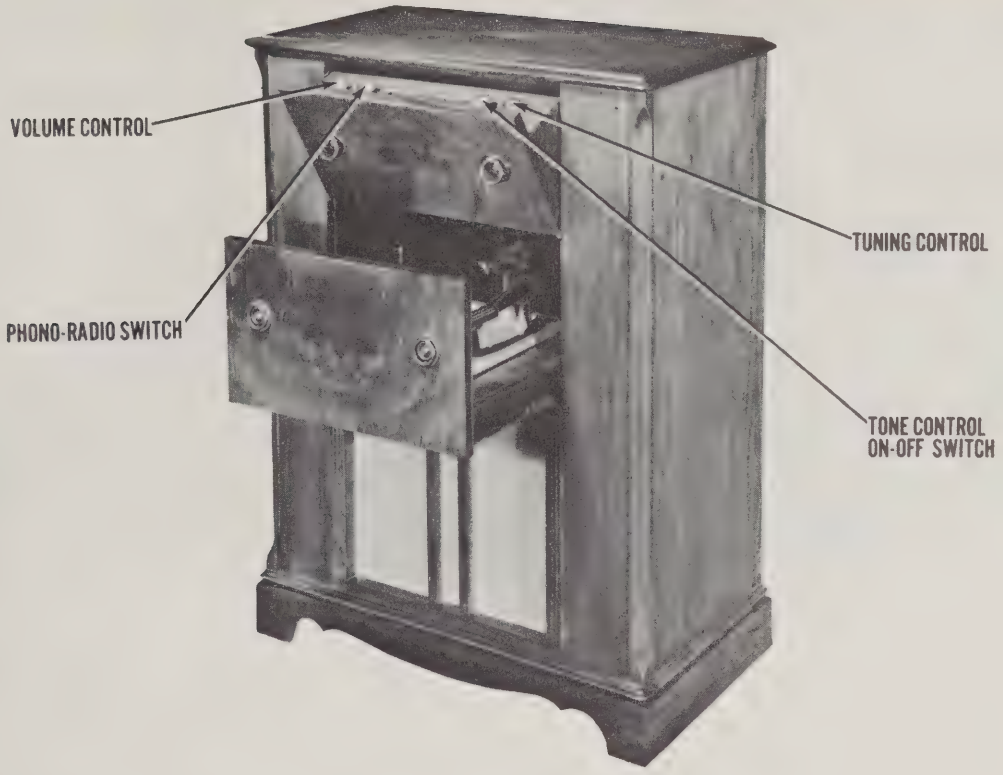
4810-9

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by shorting AVC line to chassis.

1 - DC Voltage measurements are at 20,000 ohms per volts.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
5 - Volume control at maximum, no signal applied for voltage measurements



MANTOLA MODEL
R-76162

MANTOLA MODEL R-76162

TRADE NAME	Mantola, Model R-76162
SUPPLIER	The B. F. Goodrich Co., 500 S. Main St., Akron, Ohio
TYPE SET	AC Operated Combination Phono-Radio Superheterodyne Receiver with Loop Antenna
TUBES (SIX)	Types, 12BE6 Converter, 12BA6 IF Amp., 12AT6 Det.-AVC-AF, 12AT6 Phase Inv., (2) 35B5 Power Output,
POWER SUPPLY	105-125 Volts AC
TUNING RANGE—BROADCAST	540-1600KC RATING .34 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to Pin 7 (grid) 12BE6. Low side to B-.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD. to reduce hum modulation.
2		Loop	1620KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	1400KC	Tune for maximum output.	"	A6	Adjust for maximum output.

DISASSEMBLY INSTRUCTIONS

1. Remove four push-on type control knobs.
2. Remove two Phillips head wood screws holding selenium rectifier.
3. Unsolder loop lead from wire clip.
4. Remove one hex nut holding loop antenna in cabinet.
5. Remove speaker plug from speaker.
6. Disconnect phono-motor leads.
7. Unsolder phono-pickup leads from terminal strip under record changer.
8. Unsolder black ground lead from under record changer.
9. Remove four hex nuts holding speaker in cabinet. Remove speaker from cabinet.

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

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PARTS LIST AND DESCRIPTIONS

MANTOLA
MODEL R-76162

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		MANTOLA PART No.	STANDARD REPLACEMENT		
1	Converter	12BE6	12BE6	7CH	
2	IF Amp.	12BA6	12BA6	7BK	
3	Det.-AVC-AF	12AT6	12AT6	7BT	
4	Phase Inv.	12AT6	12AT6	7BT	
5	Power Output	35B5	35B5	7BZ	
6	" "	35B5	35B5	7BZ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	MANTOLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
7A	40	150	B55487-1	PRSA150-20-40	EZ42215	DSB403020-150	TA-220	Filter-Red
B	20	150						" -Blue
C	20	150		PRS150-20			UT-401	" -Yellow
8	.05	400	BD410503	484-05	DT4S5	ST-4-05	TC-15	Line Filter
9	.05	400	BD410503	484-05	DT4S5	ST-4-05	72P1	Line Isolation
10	.02	400	BD410203	484-02	DT4S2	ST-4-02	TC-12	Output Plate Bypass
11	.02	400	BD410203	484-02	DT4S2	ST-4-02	TC-12	" "
12	.01	400	BD41013	484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
13	.01	400	BC31B103	484-01	DT4S1	ST-4-01	TC-11	" "
14	.003	600	BD610302	484-003	DT6D3	ST-6-003	TC-23	Tone Compensation
15	.01	400	BD41013	484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
16	.01	400	BD41013	484-01	DT4S1	ST-4-01	TC-11	" "
17	.1	400	BD410104	484-1	DT4P1	ST-4-.1	TC-1	Phono Isolation
18	.05	200	BD210503	484-05	DT4S5	ST-4-05	TC-15	AVC Filter
19	470	500	BM74A471	1468-0005	SW5T5	M0.5-35	1FM-35	Output Grid Bypass
20	100	500	BM74A101	1468-0001	SW5T1	M0.5-31	1FM-31	Osc. Grid Cap.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESIST-ANCE	WATTS	MANTOLA PART No.	IRC PART No.	CLAROSTAT PART No.	
21A	500KΩ	½	B-54466-2	D13-133	AM-60-Z	Volume Control
B	Shaft		Not Req.	E	KSS-3	Attach to 21A per instructions
22A	500KΩ	½	B-57841-1	D13-133	AM-60-Z	Tone Control
B	Shaft		Not Req.	E	KSS-3	Attach to 22A per instructions
C	Switch		" "	41	SW-A	" " " " "

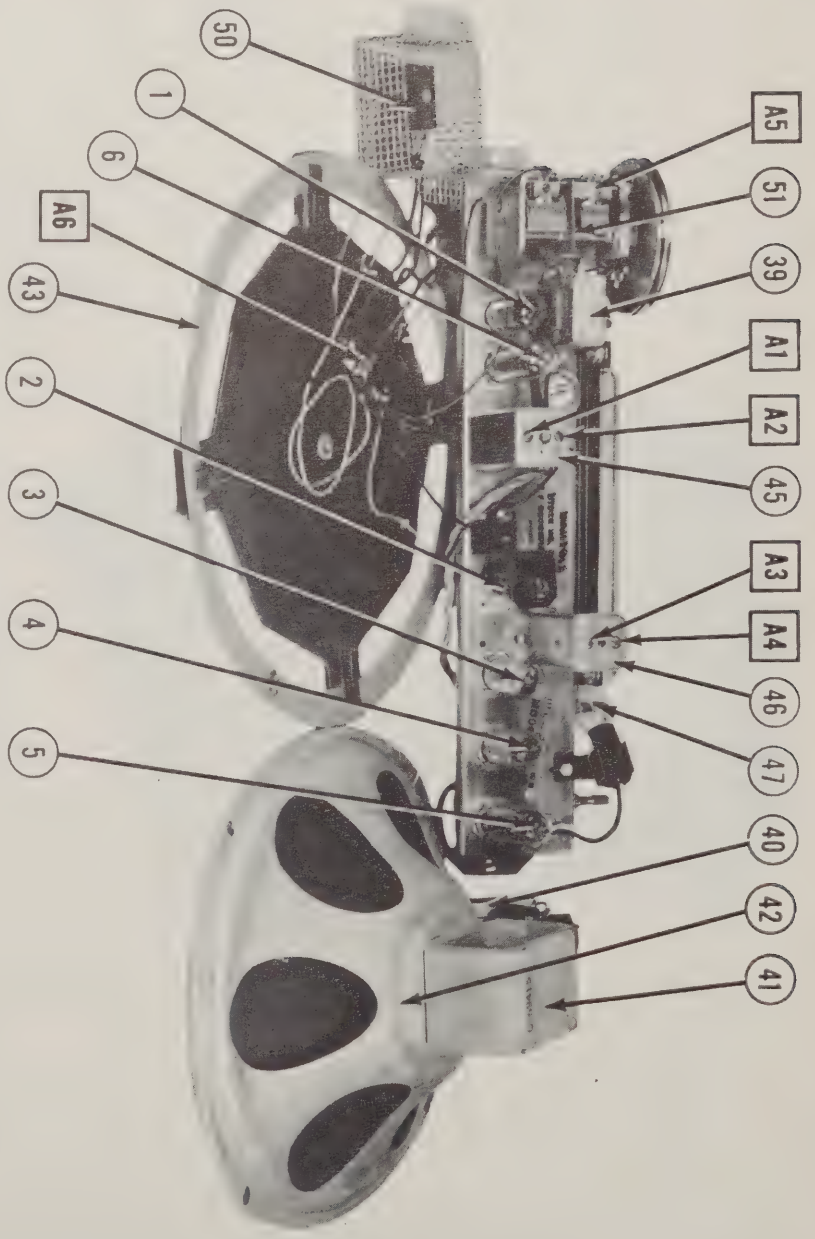
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	MANTOLA PART No.	IRC PART No.	
23	22KΩ	½	BR17B223	BTS-22K	Red-Red-Or. Oscillator Grid
24	100Ω	½	BR16B101	BW-½-100	Br.-Blk.-Br. IF Cathode
25	3.3 Meg.	½	BR17B335	BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
26	6.8 Meg.	½	BR17B685	BTS-6.8 Meg.	Blue-Gray-Grn. AF Grid
27	220KΩ	½	BR17B224	BTS-220K	Red-Red-Yl. AF Plate Load
28	220KΩ	½	BR17B224	BTS-220K	Red-Red-Yl. Phase Inverter Plate Load
29	6.8 Meg.	½	BR17B685	BTS-6.8 Meg.	Blue-Gray-Grn. Phase Inverter Grid
30	470KΩ	½	BR16B474	BTS-470K	Yl.-Vi.-Yl. Output Grid
31	15KΩ	½	BR16B153	BTS-15K	Br.-Grn.-Or. " "
32	470KΩ	½	BR16B474	BTS-470K	Yl.-Vi.-Yl. " "
33	100Ω	1	BR16E101	BW-1-100	Br.-Blk.-Br. Output Cathode
34	1500Ω	1	BR17E102	BTA-1500	Br.-Grn.-Red Filter
35	220KΩ	½	BR17B224	BTS-220K	Red-Red-Yl. Line Isolation
36	22Ω	1	BR17E220	BW-1-22	Red-Red-Blk. Surge Limiter
37	470KΩ	½	BR16B474	BTS-470K	Yl.-Vi.-Yl. Series Phono
38	220KΩ	½	BR17B224	BTS-220K	Red-Red-Yl. Phono Shunt

FILTER CHOKE

ITEM NO.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D.C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 $\sim$)	MANTOLA PART NO.	STANCOR PART NO.	THORDARSON PART NO.	MERIT PART No.	
39	.042A	90Ω	1.5 Henries	B58635				

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		MANTOLA PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
40	5000Ω CT	3.3Ω	340Ω CT	.3Ω	Part of C59415	A-3823	T22S87	A-2501	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			MANTOLA PART No.	JENSEN PART No.	QUAM PART No.	
41	FIELD	VC IMP.	C59415	ST-1201 Mod. P10-S	10A31	†Replace output transformer to match 6-8 voice coil.
	PM	3.3Ω				
42	CONE DIA.	VC DIA.				
	9"	1"				

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA	
		PRI.	SEC.	MANTOLA PART No.	MEISSNER PART No.
43	Loop Ant.	.1Ω	1Ω	C59420	
44	Osc. Coil	.7Ω	7.3Ω	B57842	
45	Input IF	24Ω	17Ω	B56722-2	16-6658
46	Output IF	19Ω		B56718-2	16-6670

DIAL LIGHT

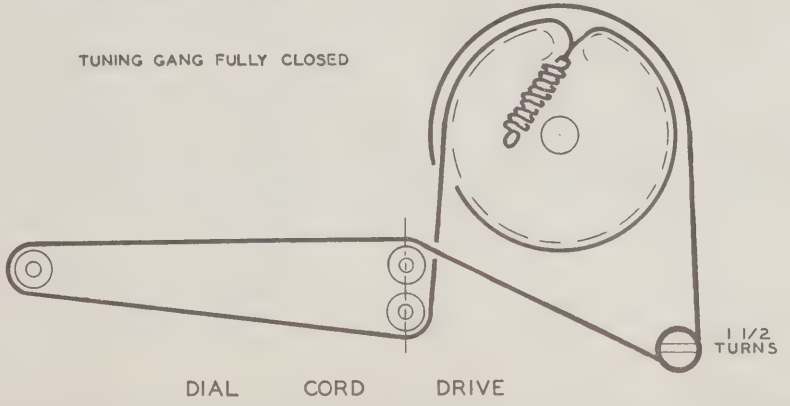
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					MANTOLA PART No.		
47	Screw	120			A55431		Type C7

PHONO CARTRIDGE

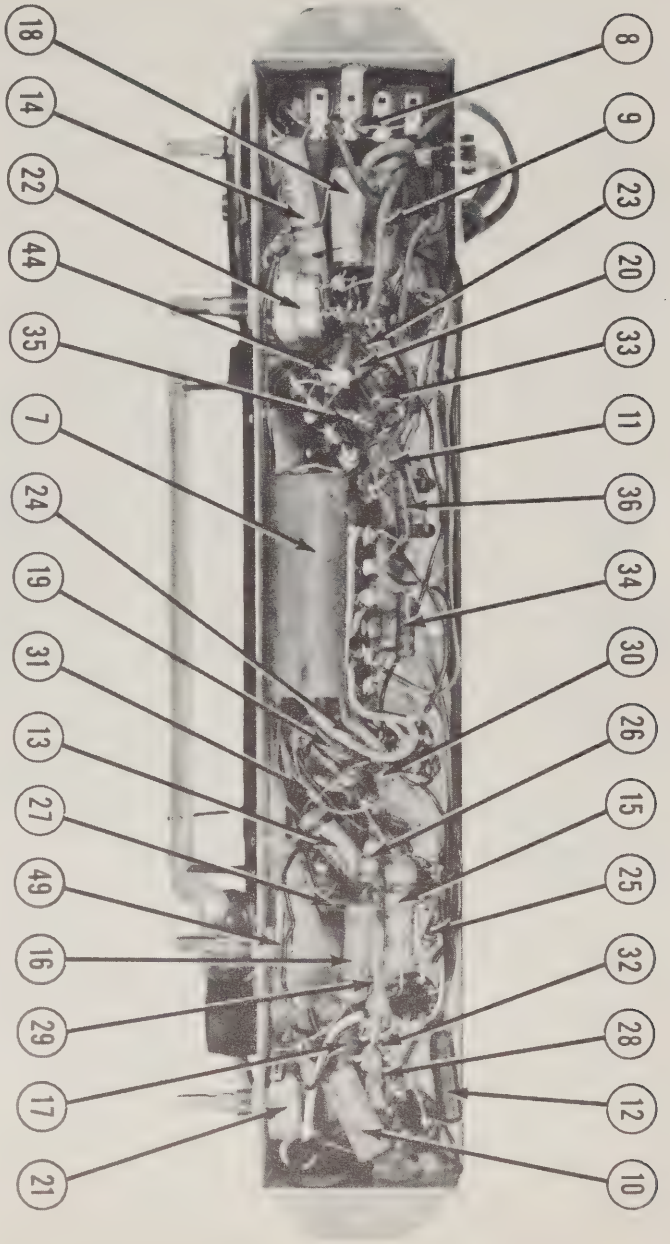
ITEM No.	REPLACEMENT DATA		REMARKS
	MANTOLA PART No.	ASTATIC PART No.	
48		L-70-A	L-70 original part.

MISCELLANEOUS

ITEM No.	PART NAME	MANTOLA PART No.	NOTES
49	Switch	B51576-2	Radio-Phono
50	Rectifier	A58612	Selenium
51	2 Gang Var. Cap.	C57859-1	(13-446 MMFD, 20-181 MMFD)
	Dial	C59414	
	Dial Pointer	B57857-1	



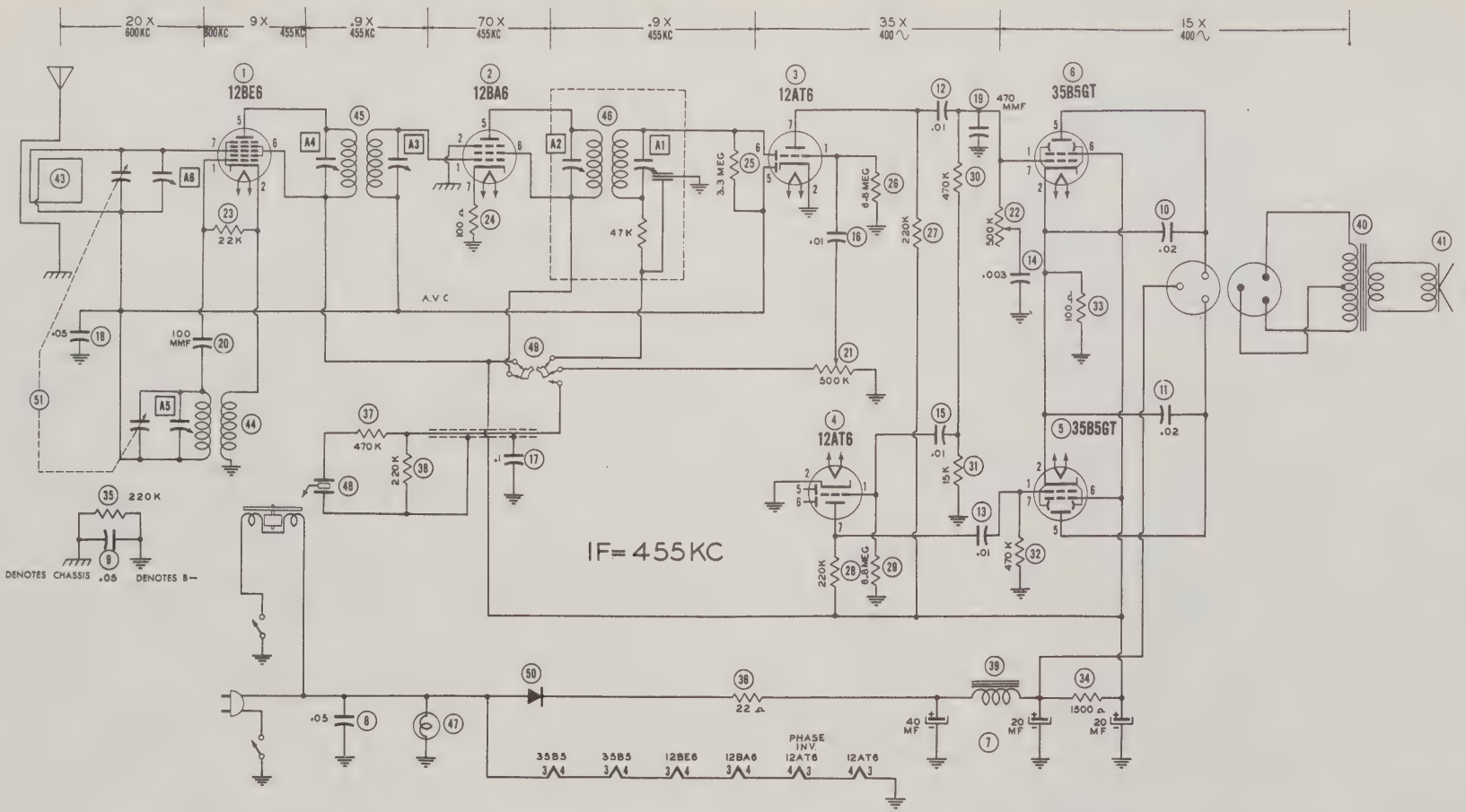
CHASSIS—BOTTOM VIEW



DATE 5/48-#4810-10 SET #40-FOLDER #10

MANTOLA MODEL R-7616S

MANTOLA MODEL R-7616S



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	12BE6	-10VDC§	0V.	52VAC	40VAC	87VDC	87VDC	-.5VDC
2	12BA6	-.5VDC	0V.	40VAC	27VAC	87VDC	87VDC	1VDC
3	12AT6	-.5VDC	0V.	0V.	13VAC	-.5VDC	-.5VDC	50VDC
4	12AT6	-.5VDC	0V.	13VAC	27VAC	-.6VDC	-.6VDC	50VDC
5	35B5	0V.	5.5VDC	82VAC	52VAC	112VDC	87VDC	0V.
6	35B5	0V.	5.5VDC	117VAC	82VAC	112VDC	87VDC	0V.

§TAKEN WITH VACUUM TUBE VOLTMETER.

RADIO-PHONO SWITCH IN RADIO POSITION.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	12BE6	22KΩ	.7Ω	40Ω	30Ω	31KΩ	31KΩ	3.8 Meg.
2	12BA6	3.8 Meg.	220KΩ	30Ω	21Ω	31KΩ	31KΩ	100Ω
3	12AT6	6.8 Meg.	0Ω	0Ω	12Ω	3.8 Meg.	540KΩ	250KΩ
4	12AT6	6.8 Meg.	0Ω	12Ω	21Ω	INF.	INF.	250KΩ
5	35B5	480KΩ	100Ω	60Ω	40Ω	30KΩ	31KΩ	480KΩ
6	35B5	470KΩ	100Ω	80Ω	60Ω	30KΩ	31KΩ	470KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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4810-10

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

MECK MODEL
CW-500

MECK MODEL
CW-500

MECK MODEL CW-500

TRADE NAME	Meck, Model CW-500
MANUFACTURER	John Meck Industries, Plymouth, Indiana
TYPE SET	AC-DC Operated TRF Receiver
TUBES (FOUR)	Types, 12BA6 RF Amp., 12AT6 Det.-AVC-AF, 50B5 Power Output, 35W4 Rectifier.
POWER SUPPLY	110-120 Volts AC-DC
TUNING RANGE—BROADCAST	540-1750KC RATING .26 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer parallel with base of dial. Use isolation transformer if available. If not, connect a .1 MFD capacitor in series with low side of signal generator and chassis.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	200MMFD	High side to junction of ant. coil and antenna bank. Low side to chassis.	1600KC	1600KC	Across voice coil	A1	Adjust for maximum output.
2	200MMFD	"	"	"	"	A2	Adjust for maximum output.

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PARTS LIST AND DESCRIPTIONS

MECK MODEL CW-500

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: MECK PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	12BA6	12BA6	7BK	
2	Det.-AVC-AF	12AT6	12AT6	7BT	
3	Power Output	50B5	50B5	7BZ	
4	Rectifier	35W4	35W4	5BC	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: MECK PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
5A	40	150		PRSA150/40-40	EDL4415	DSB-2x40-150	TA-440	Filter-Red
B	40	150						" "
6	.01	300		484-01	DT4S1	ST-4-01	TC-11	Line Filter
7	.01	300		484-01	DT4S1	ST-4-01	TC-11	Output Plate Bypass
8	.01	300		484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
9	.01	300		484-01	DT4S1	ST-4-01	TC-11	" "
10	.01	300		484-01	DT4S1	ST-4-01	TC-11	AVC Filter
11	.01	300		484-01	DT4S1	ST-4-01	TC-11	Ext. Ant. Coupling
12	50	300		1468-00005	5W5Q5	MO.5-45	1FM-45	RF Coupling-Cer.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MECK PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
13	1 Meg.	½	VCP-12105			Volume Control & Sw.

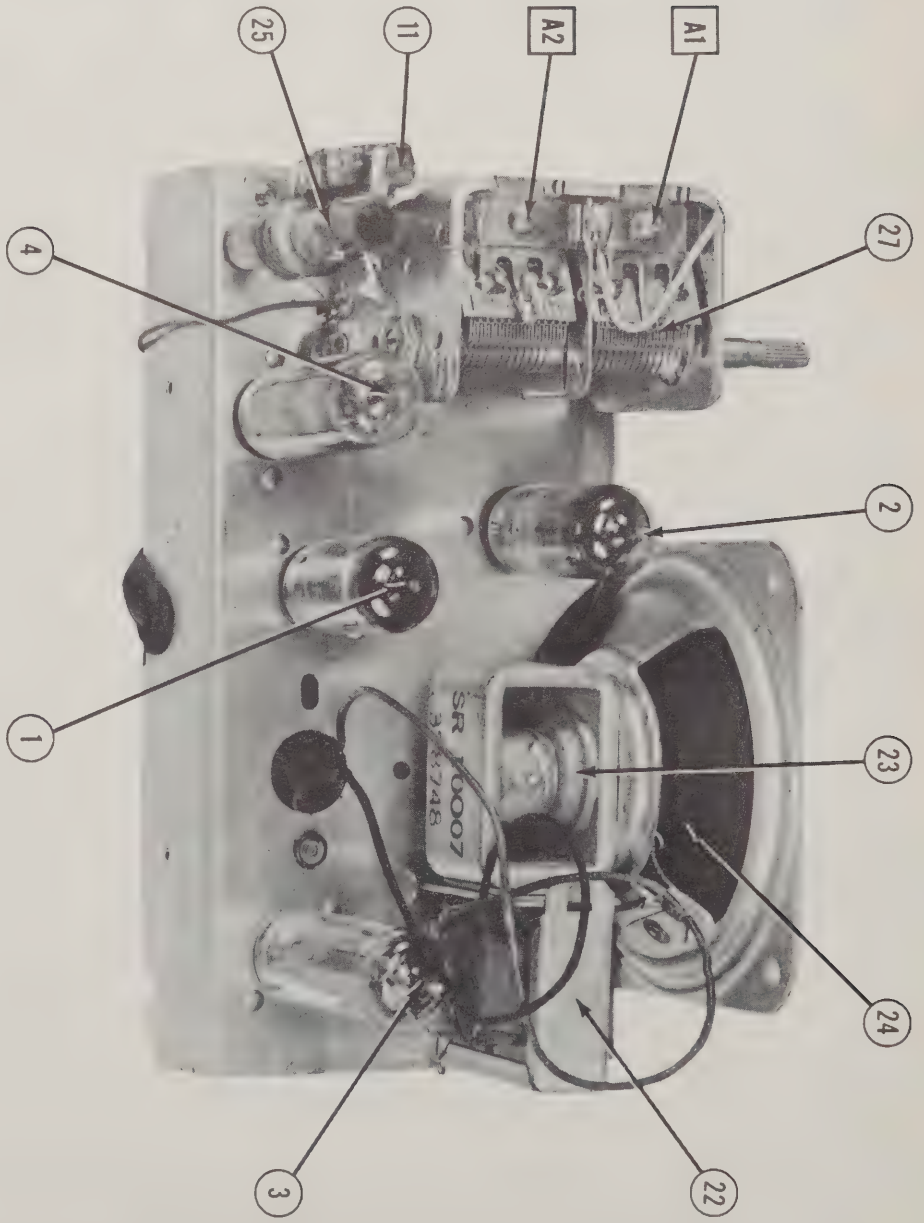
RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MECK PART No.	IRC PART No.	IDENTIFICATION CODES
14	2.2 Meg.	½		BTS-2.2 Meg.	Red-Red-Grn. AVC Network
15	100KΩ	1		BTA-100K	Br.-Blk.-Yl. Diode Filter
16	12 Meg.	½		BTS-12 Meg.	Br.-Or.-Blue AF Grid
17	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AF Plate Load
18	560KΩ	½		BTS-560K	Grn.-Blue-Yl. Output Grid
19	150Ω	½		BTS-150	Br.-Grn.-Br. Output Cathode
20	470Ω	1		BTA-470	Yl.-Vi.-Br. Filter
21	22Ω	1		BW-1-22	Red-Red-Blk. Line Dropping

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: MECK PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	INSTALLATION NOTES
22	2500Ω	3.3Ω	230Ω	.8Ω	206H549	A-3876*	T-22845*	A-2928*	*Bend mounting tabs down, file out slots and mount o original brackets.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			MECK PART No.	JENSEN PART No.	QUAM PART No.	
23	FIELD PM	VC IMP. 3.3Ω	SR10007		3A07	
24	CONE DIA. 3-1/2"	VC DIA. 1/2"				

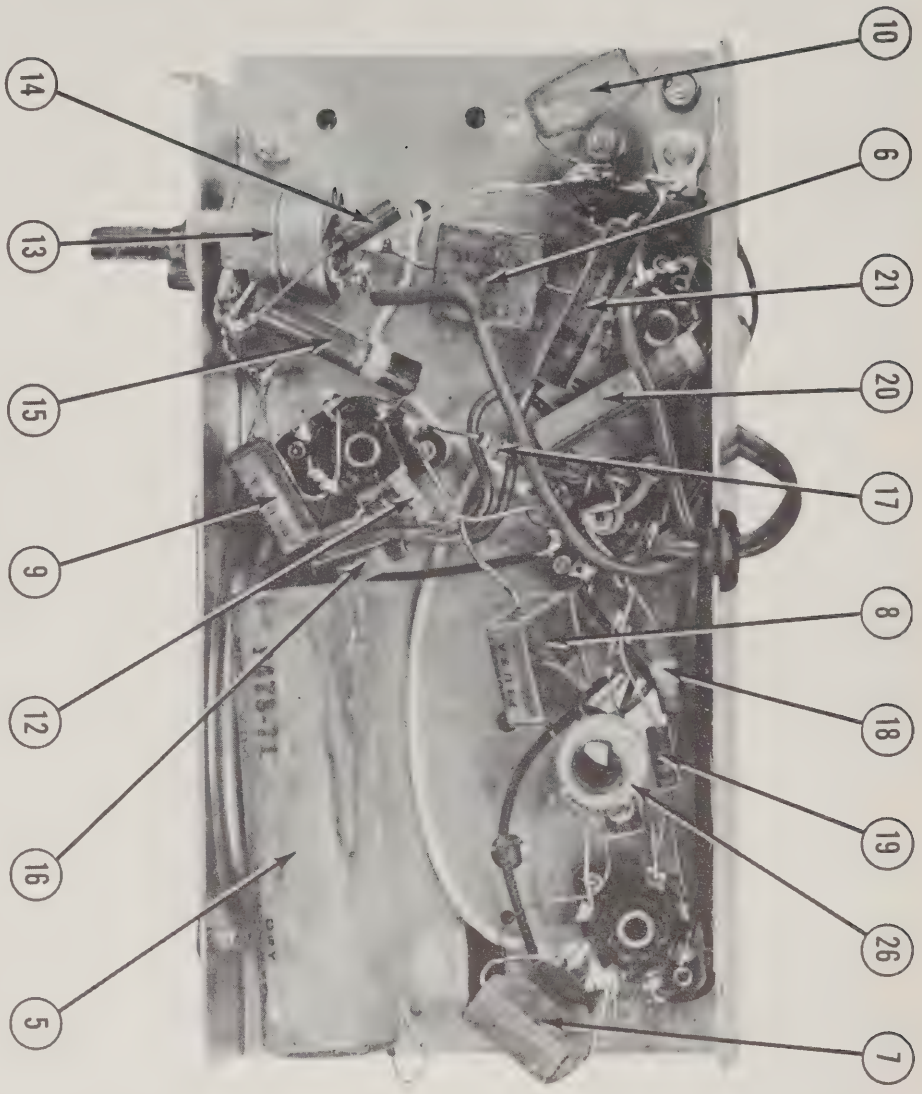
R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	MFCK PART No.	MEISSNER PART No.	
25	Ant. Coil	3.2Ω	4.2Ω			
26	RF Coil		4.2Ω			

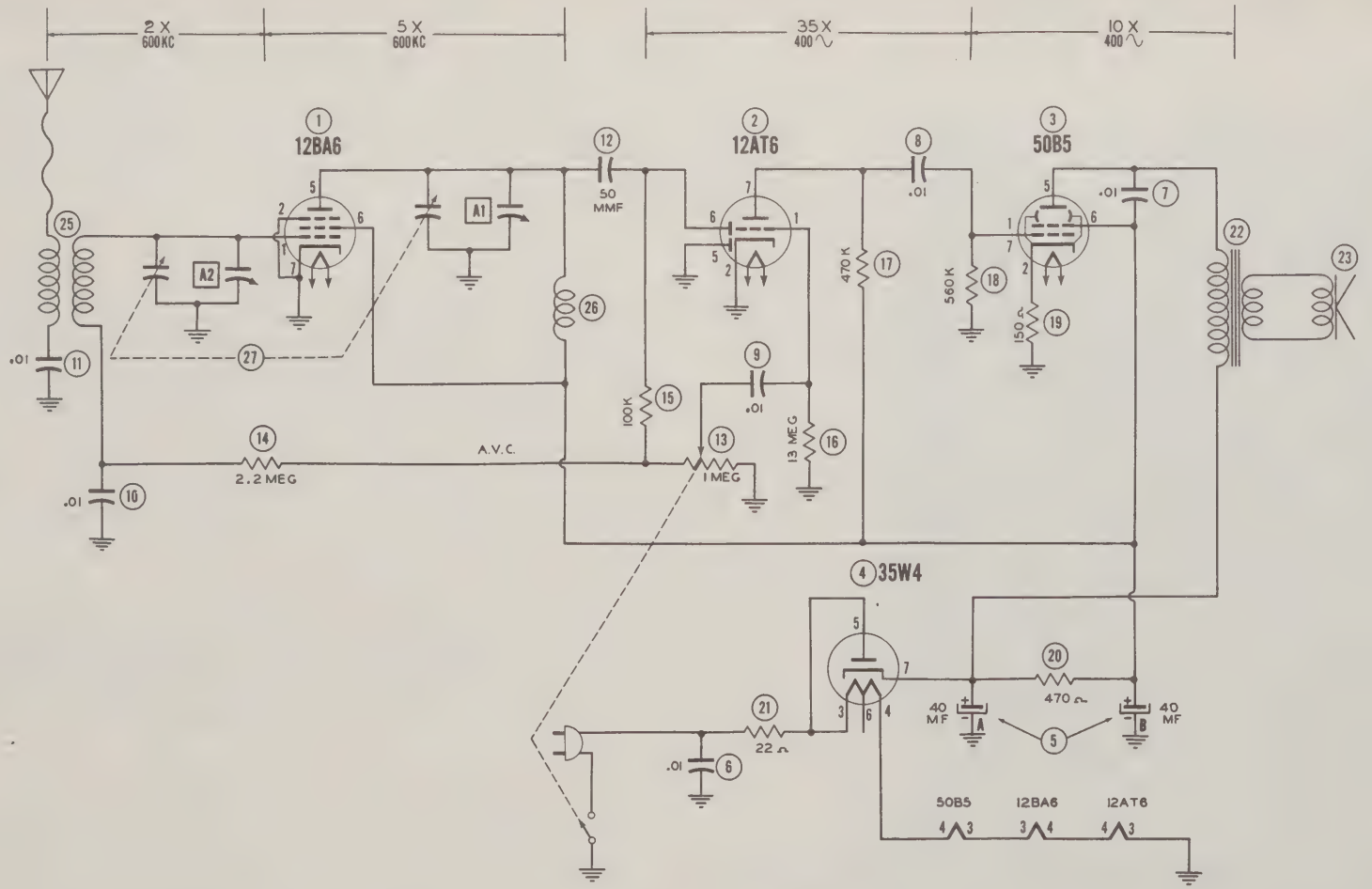
MISCELLANEOUS

ITEM No.	PART NAME	MECK PART No.	NOTES
27	2 Gang Var. Cap	470805	(25-463MTF) each section

CHASSIS—BOTTOM VIEW



MECK MODEL CM-6GO



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	12BA6	-.7VDC	0V.	26VAC	13VAC	110VDC	110VDC	0V.
2	12AT6	0V.	0V.	0V.	13VAC	0V.	-.4VDC	50VDC
3	50B5	0V.	6.6VDC	2.6VAC	77VAC	116VDC	110VDC	0V.
4	35W4	117VAC	117VAC	115VAC	77VAC	115VAC	85VAC	125VDC

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	12BA6	3.2 Meg.	0Ω	23Ω	12Ω	35KΩ	35KΩ	0Ω
2	12AT6	13 Meg.	0Ω	0Ω	1Ω	0Ω	1.1 Meg.	500KΩ
3	50B5	560KΩ	150Ω	23Ω	73Ω	35KΩ	35KΩ	560KΩ
4	35W4	125Ω	125Ω	105Ω	73Ω	105Ω	80Ω	35KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

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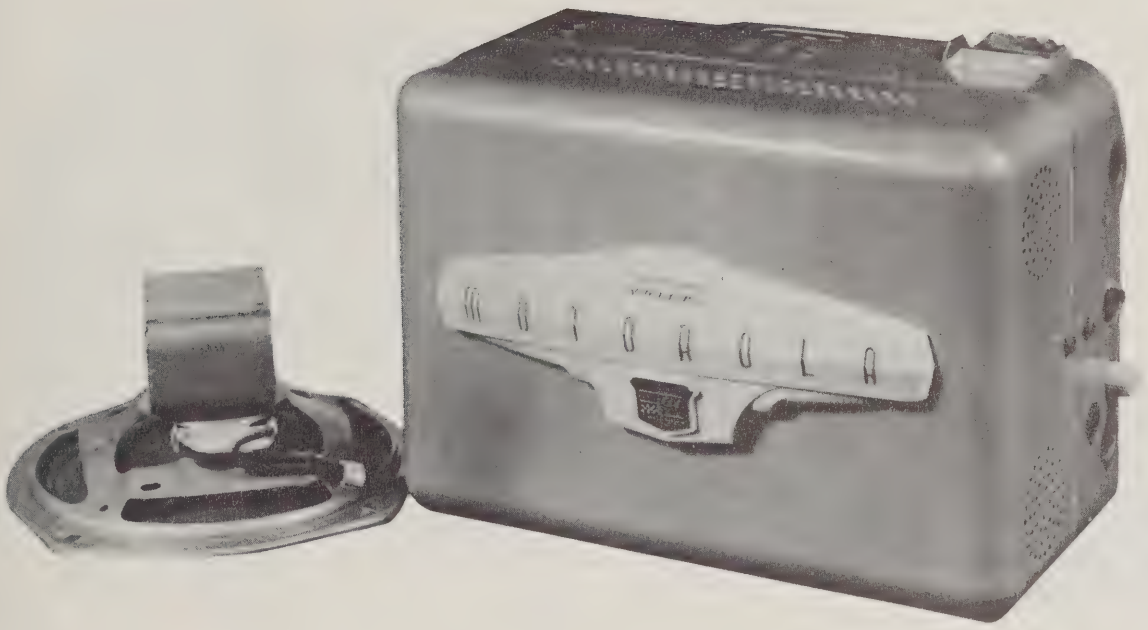
4810-11

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

MOTOROLA MODEL
708



MOTOROLA MODEL
708

MOTOROLA MODEL 708

TRADE NAME	Motorola, Model 708
MANUFACTURER	Motorola Inc., 4545 Augusta Blvd., Chicago, Ill.
TYPE SET	Battery Operated Universal Automotive Superheterodyne Receiver.
TUBES (EIGHT)	Types, 6BA6 RF Amp., 6BE6 Converter, 6BA6 IF Amp., 6AT6 Det.-AVC-AF, 6AT6 Phase Inv., (2) 6V6GT Power Output, 6X4 Rectifier.
POWER SUPPLY	6 Volt Storage Battery
TUNING RANGE—BROADCAST	535-1600KC RATING 8.5 Amp. @ 6.3 Volts DC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Set sensitivity control to give 2 volts bias (± ½ volt) on Pin 7 of 6BA6 RF Tube (1). Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to Pin 7 (grid) 6BE6. Low side to chassis.	455KC	Tuning control fully clockwise.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output.
2	60 MMFD. cap. in series with 21' coaxial lead. Cap. at gen. end	High side to ant. receptacle. Low side to chassis.	1605KC	Tuning control fully clockwise with cores projecting 1-1/8" from end of cans.	"	A5,A6, A7	Adjust for maximum output in order given.
3	"	"	1425KC	Turn tuning control to set carriage plate 1-43/64 inch from coil shield plate.	"	A8,A9, A10	Adjust cores for maximum output.
4	"	"	Gen. power off but leave connected.	Turn tuning control to set carriage plate 27/32" from coil shield plate.	"	A11	Adjust for maximum noise. If A11 has to be turned more than 1/2 turn, repeat Steps 2, 3 & 4 until A11 can be peaked with only 1/2 turn or less.
5				1400KC	"	A7	Install set in car and connect antenna. Adjust for maximum noise.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	6BA6	6BA6	7BK	
2	Converter	6BE6	6BE6	7CH	
3	IF Amp.	6BA6	6BA6	7BK	
4	Det.-AVC-AF	6AT6	6AT6	7BT	
5	Phase Inv.	6AT6	6AT6	7BT	
6	Power Output	6V6GT	6V6GT	7AC	
7	" "	6V6GT	6V6GT	7AC	
8	Rectifier	6X4	6X4	5BS	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: MOTOROLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
9A	30	450	23A472570		UP2245	DY-2x20-450	EL-330	■ Filter
B	20	400			BR1045	M-10-450		▲ "
10	.5	100	8A19133					Hash Filter
11	.5	100	8A19133					" "
12	.5	100	8A19133					" "
13	.007	1600	8K15166	1684-0075	MD16D7	STM-16-007	TR-27	Buffer
14	.003	1000	8K13165	684-003	DT6D3	ST-6-003	TC-23	Tone Compensation
15	.03	400	8K71911	484-03	DT4S3	ST-6-03	TC-13	Audio Coupling
16	.03	400	8K71911	484-03	DT4S3	ST-6-03	TC-13	" "
17	.002	400	8A4736	484-002	DT6D2	ST-6-002	TC-22	Tone Compensation
18	.05	100	8A13514	484-05	DT4S5	ST-4-05	TC-15	Audio Coupling
19	.1	400	8K13166	484-1	DT4P1	ST-4-1	TC-1	Muting Cap.
20	.006	100	8A4529	484-006	DT6D6	ST-6-006	TC-26	Tone Compensation
21	.05	400	8A14791	484-05	DT4S5	ST-4-05	TC-15	Screen Bypass
22	.1	400	8K13166	484-1	DT4P1	ST-4-1	TC-1	Decoupling
23	.05	100	8A13514	484-05	DT4S5	ST-4-05	TC-15	Cathode Bypass
24	.05	100	8A13514	484-05	DT4S5	ST-4-05	TC-15	AVC Filter
25	.006	100	8A4529	484-006	DT6D6	ST-6-006	TC-26	RF Coupling
26	500	300	21R6639	1468-0005	5W5T5	MO.5-35	1FM-35	AF Plate Bypass
27	50	300	21K74661	1468-00005	5W5Q5	MO.5-45	1FM-45	IF Coupling-Cer.
28A	100		*	1468-0001	5W5T1	MO.5-31	1FM-31	Diode RF Filter-Cer.
B	100		*	1468-0001	5W5T1	MO.5-31	1FM-31	" " " "
29	50	300	21K74661	1468-00005	5W5Q5	MO.5-45	1FM-45	Osc. Grid Cap. - " "
30	400	500	21A71872	1469-0004	5R5T4	MOS.5-34	MS-34	Fixed Trimmer - " "
31	5	500	21K70720	1468-000005	5W5V5	MO.5-55	MS-55	RF Coupling - " "
32	100	500	21B77562	1468-0001	5W5T1	MO.5-31	1FM-31	Fixed Trimmer - "

Items 28A, 28B and 61 can be obtained as one unit under Part #21A472571.

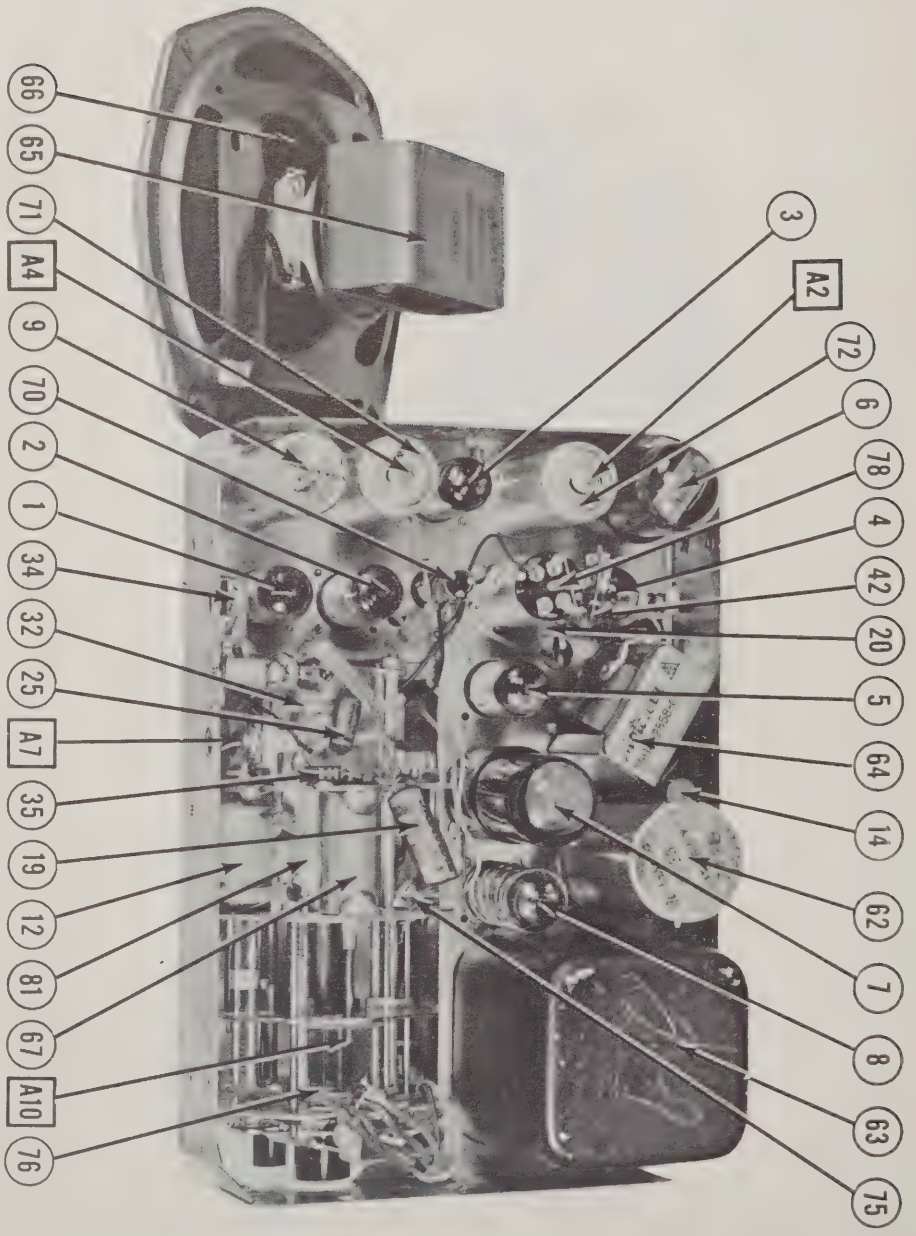
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MOTOROLA PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
33A	500KΩ	½	18A4e0773	D13-133	M-60-Z	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 33A per instructions
C	Switch		" "	41	SW-A	" " " " "
34	700Ω	1	18K77552			Sensitivity Control

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MOTOROLA PART No.	IRC PART No.	IDENTIFICATION CODES
35	470KΩ	½	6R6032	BTS-470K	Yl.-Vi.-Yl. RF Grid
36	150Ω	½	6R3992	BW-½-150	Br.-Grn.-Br. RF Cathode
37	100KΩ	½	6R6075	BTS-100K	Br.-Blk.-Yl. Converter Grid
38	47KΩ	½	6R6056	BTS-47K	Yl.-Vi.-Or. Oscillator Grid
39	68KΩ	½	6R6001	BTS-68K	Blue-Gray-Or. Cathode Dropping
40	10KΩ	2	6R476060	BT-2-10K	Br.-Blk.-Or. Screen Dropping

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	Motorola A PART No.	IRC PART No.	
41	330Ω	±	GR6016	BW-½-330	Or.-Or.-Br. Decoupling
42	100KΩ	±	GR6075	BTS-1 K	Br.-Blk.-Yl. Tone Compensation
43	150Ω	±	6R3992	BW-½-150	Br.-Grn.-Br. IF Cathode
44	1 Meg.	±	6R6004	BTS-1 Meg.	Br.-Blk.-Grn. AVC Network
45	1 Meg.	±	6R6004	BTS-1 Meg.	Br.-Blk.-Grn. Diode Load
46	2.2 Meg.	±	6R3927	BTS-2.2 Meg.	Red-Red-Grn. Bias Network
47	1 Meg.	±	6R6004	BTS-1 Meg.	Br.-Blk.-Grn. AF Grid
48	1500Ω	±	6R6161	BTS-1500	Br.-Grn.-Red AF Cathode
49	220KΩ	±	6R6015	BTS-220K	Red-Red-Yl. AF Plate Load
50	220KΩ	±	6R6015	BTS-220K	Red-Red-Yl. Phase Inverter Plate Load
51	2200Ω	±	6R6069	BTS-2200	Red-Red-Red Phase Inverter Cathode
52	10KΩ	±	6R6054	BTS-10K	Br.-Blk.-Or. Phase Inverter Grid
53	220KΩ	±	6R6015	BTS-220K	Red-Red-Yl. Output Grid
54	220KΩ	±	6R6015	BTS-220K	Red-Red-Yl. Output Grid
55	220Ω	1	6R6389	BW-1-220	Red-Red-Br. Output Cathode
56	2200Ω	2	6R476130	BT-2-2200	Red-Red-Red Filter
57	10KΩ	±	6R6320	BTS-10K	Br.-Blk.-Or. Hash Suppression
58	56Ω	±	6R5614	BW-½-56	Grn.-Blue-Blk. " "
59	56Ω	±	6R5614	BW-½-56	Grn.-Blue-Blk. " "
60	470Ω	±	6R3949	BTS-470	Yl.-Vi.-Br. Bias
61	47KΩ	±	*	BTS-47K	Yl.-Vi.-Or. Diode RF Filter

*Items 61, 28A & 28B can be obtained as one unit under Part #21A472571.

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA		INSTALLATION NOTES
				MOTOROLA PART No.	RADIART PART No.	
62	Interrupter	6.3	115 ∿	48B3333	5342M	

TRANSFORMER (VIBRATOR)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	MOTOROLA PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
63	6V DC @ 4.9A	560V CT @ .077A			25B472586	P-4063†	T22R221	

†Drill new mounting holes.

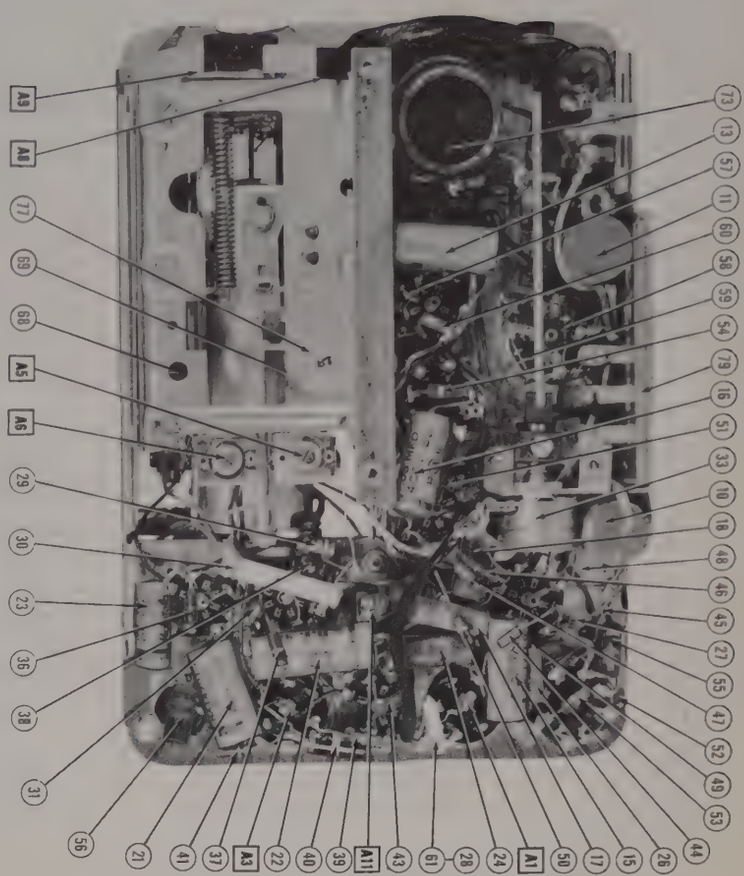
TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		MOTOROLA PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
64	12000Ω CT	3.2Ω	390Ω CT	.4Ω	25B472558	A-3850	T22S86	A-2900	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			MOTOROLA PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	VC IMP.		ST-110		
65	PM	3.2Ω	50B473783	Mod. P6-V	6A21	
	CONE DIA.	VC DIA.				
66	6"	3/4"				

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	MOTOROLA PART No.	MEISSNER PART No.	
67	Ant. Coil		1Ω	24B71881		Items 67, 68 and 69 are slug tuned and ganged together.
68	RF Coil		1Ω	24B71881		
69	Osc. Coil		2.8Ω	24B71879		
70	Osc. Pad Coil		2.8Ω	24B70227		
71	Input IF	20Ω	20Ω	24B76553		
72	Output IF	20Ω	20Ω	24B76553		
73	Hash Choke		0Ω	24C473654		

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					MOTOROLA PART No.		
74	Bayonet	7.5	0.2	White	65X4151		Type 51

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
75	Switch	1B70944	Solenoid
76	"	40B70952	Selector
77	"	40A472644	Mute
78	Relay	1X78040	Tone
79	Spark Plate	1X472624	
80	Fuse	65K4637	20 Amp.
81	Tuner Assby.	1X472634	
82	Button		Set-Up
83	Knob	38A71874	" "
A5	Trimmer	20K472612	Osc. Adj.
A6	"	20K472613	RF Adj.
A7	"	20K472613	Ant. Adj.

PUSHBUTTON ADJUSTMENTS

1. Turn set on and allow to warm up for at least five minutes.
2. Collapse antenna until signal is weak.
3. Press manual "M" button on control head.
4. Turn tuning knob until desired station is heard.
5. Press desired button and hold in until tuning mechanism completes its operation.
6. Press "set-up knob" (82) until click is heard.
7. Turn "set-up knob" (83) until previously noted program is heard. This station is now set up.
8. Repeats Steps 3 to 7 for each additional station desired.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6BA6	-.2VDC	0V.	6.3VDC	0V.	190VDC	82VDC	1.5VDC	-
2	6BE6	-7.5VDC	0V.	6.3VDC	0V.	190VDC	67VDC	-.1VDC	-
3	6BA6	-.1VDC	0V.	6.3VDC	0V.	195VDC	82VDC	1VDC	-
4	6AT6	0V.	2.3VDC	6.3VDC	0V.	0V.	-.7VDC	137VDC	-
5	6AT6	0V.	1.1VDC	0V.	6.3VDC	.2VDC	.2VDC	137VDC	-
6	6V6GT	0V.	0V.	240VDC	250VDC	0V.	0V.	6.3VDC	12.5VDC
7	6V6GT	0V.	0V.	240VDC	250VDC	0V.	0V.	6.3VDC	12.5VDC
8	6X4	280VAC	0V.	0V.	6VDC	280VAC	280VAC	250VDC	-

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

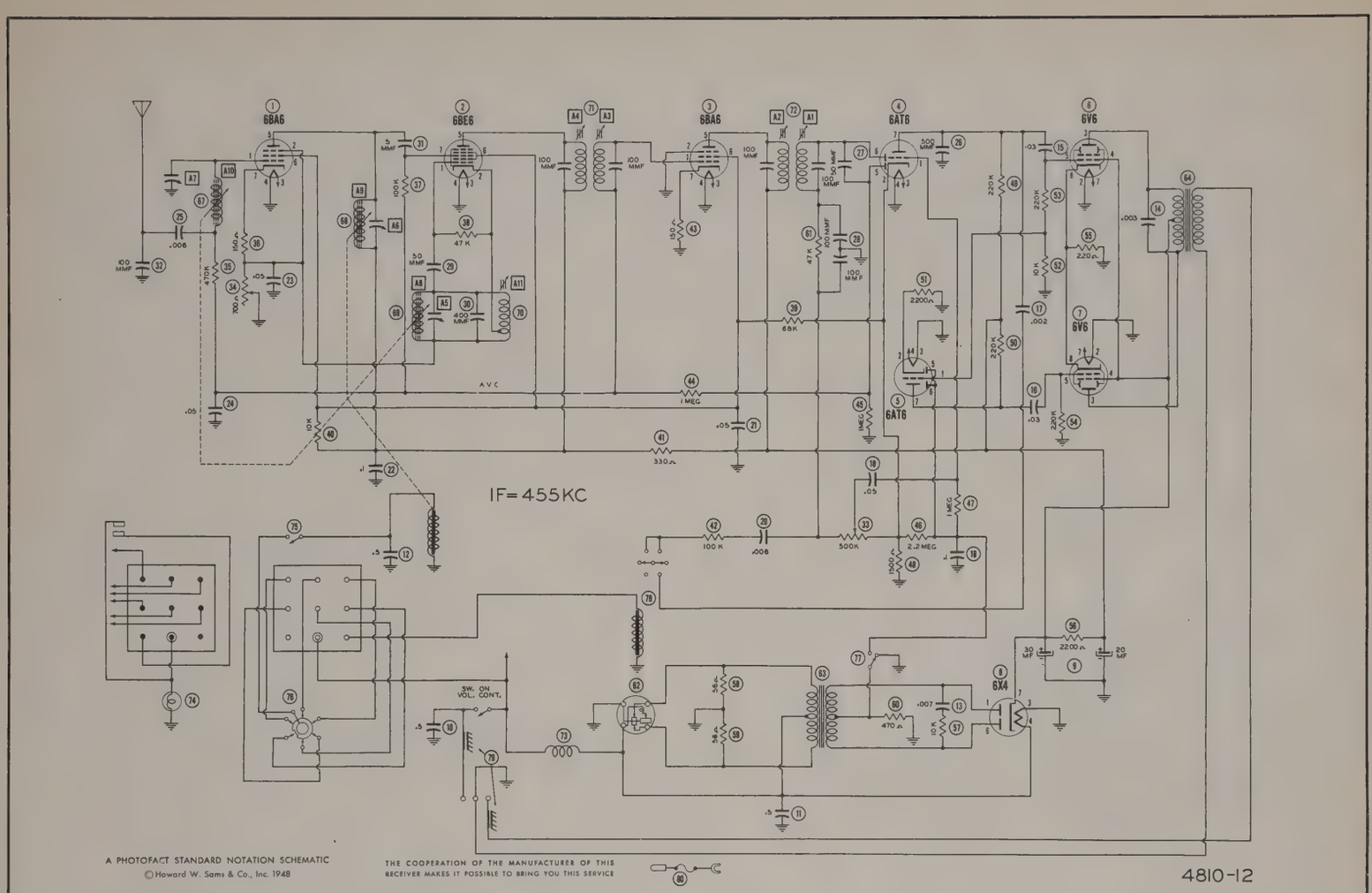
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6BA6	2.5 Meg.	0Ω	.5Ω	0Ω	70KΩ	80KΩ	150Ω	-
2	6BE6	47KΩ	.5Ω	.5Ω	0Ω	70KΩ	80KΩ	2.1 Meg.	-
3	6BA6	2 Meg.	0Ω	.5Ω	0Ω	70KΩ	80KΩ	150Ω	-
4	6AT6	3.2 Meg.	1.5KΩ	.5Ω	0Ω	1 Meg.	540KΩ	290KΩ	-
5	6AT6	10KΩ	2.2KΩ	0Ω	.5Ω	2.2 Meg.	2.2 Meg.	290KΩ	-
6	6V6	10KΩ	0Ω	70KΩ	70KΩ	220KΩ	INF.	.5Ω	220Ω
7	6V6	INF.	0Ω	70KΩ	70KΩ	220KΩ	INF.	.5Ω	220Ω
8	6X4	190Ω	0Ω11	0Ω	.5Ω	10KΩ	175Ω	70KΩ	-

††MUTE SWITCH GROUNDED.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Battery voltage maintained at 6.3 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - Volume and sensitivity control at maximum, no signal applied for voltage measurements.

DATE 5/48-4810-12 SET #40-FOLDER #12



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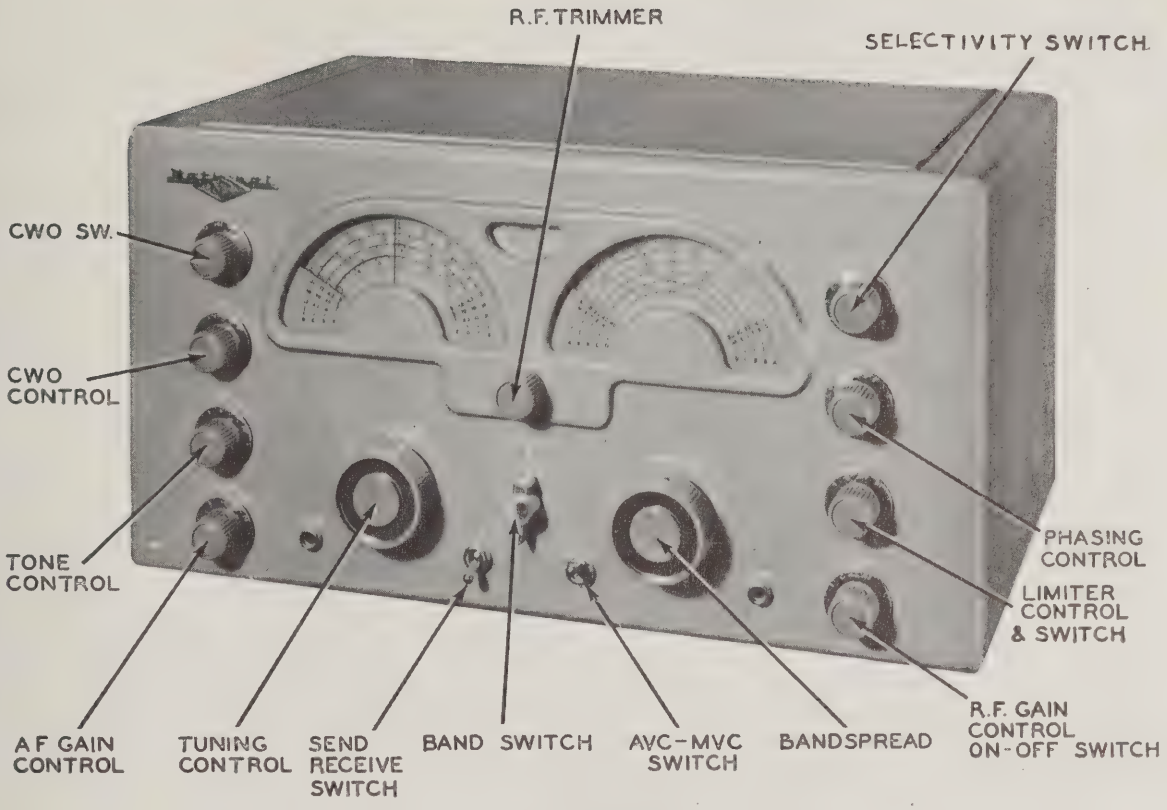
4810-12

NATIONAL MODELS
NC-173R, NC-173T



NATIONAL MODELS
NC-173R, NC-173T

NATIONAL MODEL NC-173T

TRADE NAME	National, Model NC-173R, NC-173T
MANUFACTURER	National Co., Inc., 61 Sherman St., Malden, Mass.
TYPE SET	AC Operated Five Band Superheterodyne Commercial Type Radio Receiver
TUBES (THIRTEEN)	Types, 6SG7 RF Amp., 6SA7 Mixer, 6J5 Osc., 6SG7 1st IF Amp., 6SG7 2nd IF Amp., 6H6 Det.-AVC, 6H6 Limiter, 6AC7 AVC Amp., 6SJ7 BFO, 6SJ7 AF Amp., 6V6GT Power Output, OD3/VR150 Voltage Regulator, 5Y3GT Rectifier.
POWER SUPPLY	110-120 Volts AC or 220-240 Volts AC
RATING	.68 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1600KC SHORT WAVE 1.6-4.3MC, 4.3MC-12MC, 12MC-31MC, 48-56MC

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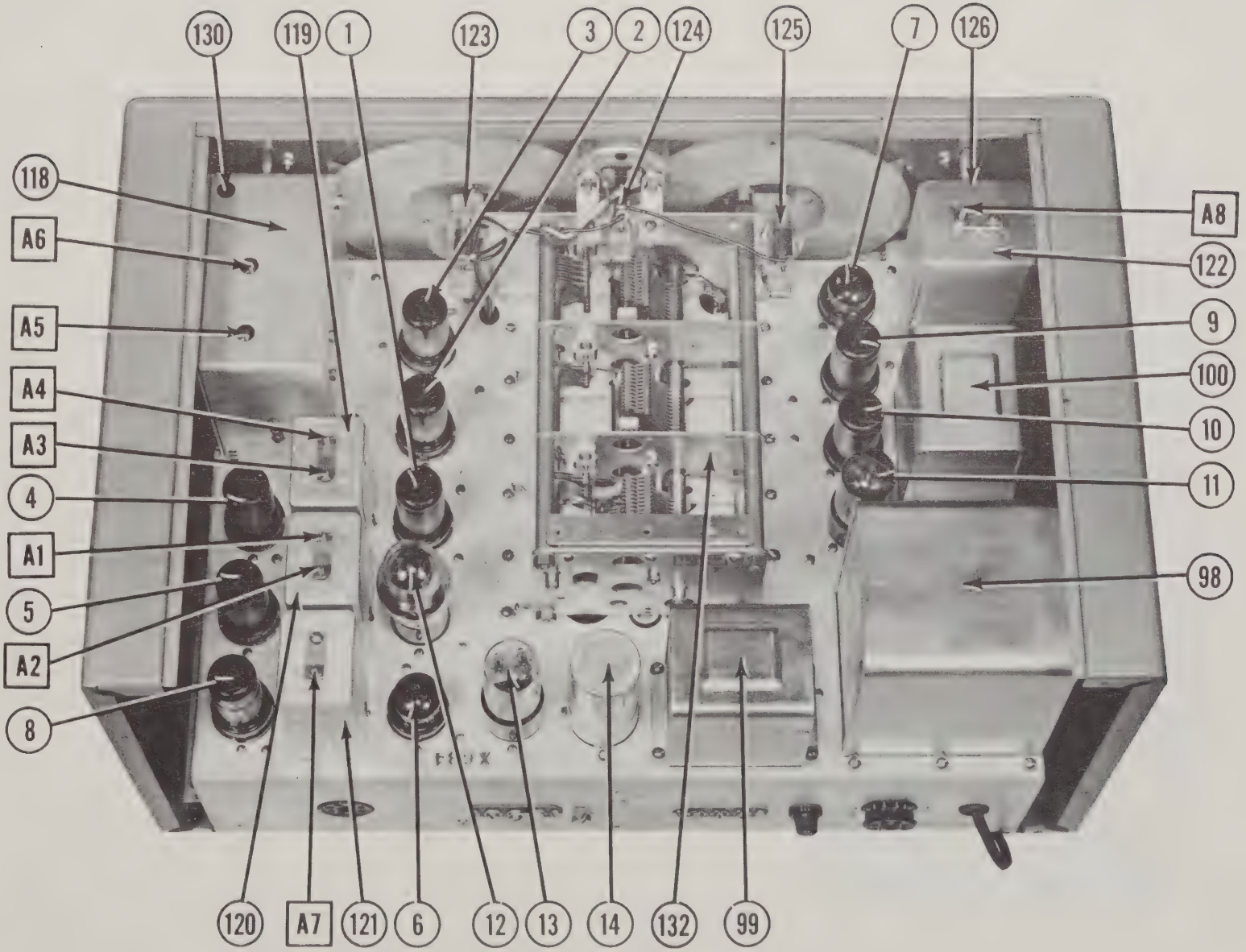
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98
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A7
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132
99

A15
A13
A17
A10
A12
A14
A16
A18
A11
A9
A19

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: NATIONAL PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	6SG7	6SG7	8BK	
2	Mixer	6SA7	6SA7	8R	
3	Oscillator	6J5	6J5	6Q	
4	1st IF Amp.	6SG7	6SG7	8BK	
5	2nd IF Amp.	6SG7	6SG7	8BK	
6	Det.-AVC	6H6	6H6	7Q	
7	Limiter	6H6	6H6	7Q	
8	AVC Amp.	6AC7	6AC7	8N	
9	BFO	6SJ7	6SJ7	8N	
10	AF Amp.	6SJ7	6SJ7	8N	
11	Power Output	6V6GT	6V6GT	7AC	
12	Voltage Reg.	OD3/VR150	OD3/VR150	4AJ	
13	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: NATIONAL PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
14A	8	475		GL475-8-8	KRC588	DH-8-525	CL-88	Filter-Grn.
B	8	475				DH-8-525		" -Red
15	25	50		PRS50-25	BR255	M-25-50	TA-525	Bias Filter
16	25	50		PRS50-25	BR255	M-25-50	TA-525	Cathode Bypass
17	25	50		PRS50-25	BR255	M-25-50	TA-525	" "
18	.01	600		684-01	DT6S1	MPH-6-01	TC-11	Line Filter
19	.01	600		684-01	DT6S1	MPH-6-01	TC-11	" "
20	.005	300		684-005	DT6D5	ST-6-005	TC-25	Output Plate Bypass
21	.1	400		484-.1	DT4P1	ST-4-1	TC-1	Audio Coupling
22	.1	400		484-.1	DT4P1	ST-4-1	TC-1	AF Plate Decoupling
23	.1	400		484-.1	DT4P1	ST-4-1	TC-1	AF Screen Bypass
24	.005	300		684-005	DT6D5	ST-6-005	TC-25	Tone Comp.
25	.1	400		484-.1	DT4P1	ST-4-1	TC-1	CW Osc. Screen Bypass
26	.01	600		684-01	DT6S1	ST-6-01	TC-11	S-Meter Bypass
27	.05	600		684-05	DT6S5	ST-6-05	TC-15	AVC Amp. Decoupling
28	.01	600		684-01	DT6S1	ST-6-01	TC-11	AVC Amp. Screen Bypass
29	.01	600		684-01	DT6S1	ST-6-01	TC-11	Audio Coupling
30	.1	400		484-.1	DT4P1	ST-4-1	TC-1	Bias Filter
31	.1	400		484-.1	DT4P1	ST-4-1	TC-1	Limiter Stabilizing
32	.05	600		684-05	DT6S5	ST-6-05	TC-15	2nd IF Decoupling
33	.01	600		684-01	DT6S1	ST-6-01	TC-11	2nd IF Screen Bypass
34	.1	400		484-.1	DT4P1	ST-4-1	TC-1	AVC Filter
35	.05	600		684-05	DT6S5	ST-6-05	TC-15	1st IF Decoupling
36	.01	600		684-01	DT6S1	ST-6-01	TC-11	1st IF Screen Bypass
37	.01	600		684-01	DT6S1	ST-6-01	TC-11	AVC Filter
38	.1	400		484-.1	DT4P1	ST-4-1	TC-1	" "
39	.05	600		684-05	DT6S5	ST-6-05	TC-15	Conv. Plate Decoup.
40	.01	600		684-01	DT6S1	ST-6-01	TC-11	Conv. Screen Bypass
41	.1	400		484-.1	DT4P1	ST-4-1	TC-1	Conv. Cathode Bypass
42	.1	400		484-.1	DT4P1	ST-4-1	TC-1	RF Bypass Pwr. Supply
43	.05	600		684-05	DT6S5	ST-6-05	TC-15	RF Plate Decoupling
44	.01	600		684-01	DT6S1	ST-6-01	TC-11	RF Screen Bypass
45	.1	400		484-.1	DT4P1	ST-4-1	TC-1	Filter Bypass
46	10	500		1468-00001	5W5Q1	MO.5-41	MS-41	CW Osc. Coupling-Cer.
47	270	500		1468-0003	5W5T3	MO.5-33	1FM-33	RF Bypass
48	1000	300		1468-001	1W5D1	MO.3-21	1FM-21	Osc. Plate Coupling
49	100	500		1468-0001	5W5T1	MO.5-31	1FM-31	Osc. Grid Coupling-Cer.
50	8500	300						Fixed Pad
51	4300	300						" "
52	1250	300						" "
53	420	500						" "
54	10	500		1468-00001	5W5Q1	MO.5-41	MS-41	RF Coupling-Cer.
55	1000	300		1468-001	1W5D1	MO.3-21	1FM-21	" "
133	47	500		1468-00005	5W5Q5	MO.5-45	1FM-45	IF Coupling-Cer.

PARTS LIST AND DESCRIPTIONS (Continued)

FILTER CHOKE

ITEM NO.	RATINGS: TOTAL DIRECT CURRENT	RATINGS: D. C. RESISTANCE	RATINGS: INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA: NATIONAL PART NO.	REPLACEMENT DATA: STANCOR PART NO.	REPLACEMENT DATA: THORDARSON PART NO.	REPLACEMENT DATA: MERIT PART No.	INSTALLATION NOTES
99	.095A	290Ω	12 Henries		C-1001*	T20C54*	C-2993*	*Drill new mounting holes.

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: NATIONAL PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: THORDAR'N PART No.	REPLACEMENT DATA: MERIT PART No.	INSTALLATION NOTES
100	5800Ω CT	500Ω tapped (a) 8Ω	300Ω	37Ω tapped (a) .8Ω		A-3310*	T22S68*		*Drill new mounting holes.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: NATIONAL PART No.	REPLACEMENT DATA: JENSEN PART No.	REPLACEMENT DATA: QUAM PART No.	INSTALLATION NOTES
	FIELD	VC IMP.				
101	PM	8Ω				
	CONE DIA.	VC DIA.				
102	6"	3/4"				

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: NATIONAL PART No.	REPLACEMENT DATA: MEISSNER PART No.
	Band				
103	Ant. Coil E	2.2Ω	3.8Ω		
104	" " D	1Ω	.1Ω		
105	" " C	.5Ω	.1Ω		
106	" " B	.1Ω	.1Ω		
107	" " A	.1Ω	.1Ω		
108	RF Coil E	.8Ω	4.5Ω		
109	" " D	.1Ω	.1Ω		
110	" " C	0Ω	.1Ω		
111	" " B	.1Ω	.1Ω		
112	" " A	.1Ω	0Ω		
113	Osc. Coil E	.8Ω	2.2Ω		
114	" " D	.3Ω	.1Ω		
115	" " C	.1Ω	.1Ω		
116	" " B	.1Ω	.1Ω		
117	" " A	0Ω	0Ω		
118	Input IF	1.8Ω	1.8Ω		
119	Inter. IF	2Ω	1.9Ω	SA3363	
120	Output IF	1.8Ω	1.8Ω	SA3363	
121	AVC Trans.		1.8Ω	SA3673	
122	Osc. Trans.		.5Ω	SA3638	

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: NATIONAL PART No.	REPLACEMENT DATA:	INSTALLATION NOTES
123-125	Bayonet	6-8	0.15	Brown			Type 47

MISCELLANEOUS

ITEM No.	PART NAME	NATIONAL PART No.	NOTES
126	Switch		CWO Switch
127	"		Band
128	"		Send-Receive
129	"		AVC-MVC
130	"		Selectivity
131	Fuse		2 Amp.
132	3 Gang Var. Cap.		(15-374MMF) each section

PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	NATIONAL PART No.	IRC PART No.	CLAROSTAT PART No.	
56A	500KΩ	½		D13-133	M-60-Z	AF Gain Control
B	Shaft			A	Not Req.	Attach to 56A per instructions
57	10KΩ	½			58S-10K	RF Gain Control & AC Switch
58A	100KΩ	½		D11-128	M-49-S	Limiter Control & Limiter Switch
B	Shaft			A	Not Req.	Attach to 58A per instructions.
C	Switch			43	SW-A1	" " " "
59A	500KΩ	½		D13-133	M-60-Z	Tone Control
B	Shaft			A	Not Req.	Attach to 59A per instructions

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	NATIONAL PART No.	IRC PART No.	
60	100KΩ	½		BTS-100K	Br.-Blk.-Yl. RF Grid
61	33KΩ	½		BTS-33K	Or.-Or.-Or. RF Screen Dropping
62	2200Ω	½		BTS-2200	Red-Red-Red RF Plate Decoupling
63	220Ω	½		BW-½-220	Red-Red-Br. Converter Cathode
64	33KΩ	½		BTS-33K	Or.-Or.-Or. Converter Screen Dropping
65	2200Ω	½		BTS-2200	Red-Red-Red Converter Plate Decoupling
66	22KΩ	½		BTS-22K	Red-Red-Or. Oscillator Grid
67	47KΩ	½		BTS-47K	Yl.-Vi.-Or. Oscillator Plate Load
68	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AVC Network
69	33KΩ	½		BTS-33K	Or.-Or.-Or. 1st IF Screen Dropping
70	2200Ω	½		BTS-2200	Red-Red-Red 1st IF Decoupling
71	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AVC Network
72	100KΩ	½		BTS-100K	Br.-Blk.-Yl. 2nd IF Screen Dropping
73	2200Ω	½		BTS-2200	Red-Red-Red 2nd IF Decoupling
74	68KΩ	½		BTS-68K	Blue-Gray-Or. Diode Load
75	270KΩ	½		BTS-270K	Red-Vi.-Yl. Limiter Filter
76	270KΩ	½		BTS-270K	Red-Vi.-Yl. Limiter Load
77	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AVC Amp. Grid
78	33KΩ	½		BTS-33K	Or.-Or.-Or. AVC Amp. Screen Dropping
79	2200Ω	½		BTS-2200	Red-Red-Red AVC Amp. Decoupling
80	330Ω	½		BW-½-330	Or.-Or.-Br. Bias Network
81	1800Ω	2		BT-2-1800	Br.-Gray-Red " "
82	1800Ω	2		BT-2-1800	Br.-Gray-Red " "
83	2200Ω	2		BT-2-2200	Red-Red-Red-Voltage Dropping
84	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AVC Network
85	100KΩ	½		BTS-100K	Br.-Blk.-Yl. " "
86	100KΩ	½		BTS-100K	Br.-Blk.-Yl. Bleeder
87	100KΩ	½		BTS-100K	Br.-Blk.-Yl. BFO Screen Dropping
88	220KΩ	½		BTS-220K	Red-Red-Yl. BFO Plate Load
89	100Ω	½		BW-½-100	Br.-Blk.-Br. Feedback
90	10KΩ	½		BTS-10K	Br.-Blk.-Or. "
91	2200Ω	½		BTS-2200	Red-Red-Red AF Cathode
92	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AF Screen Dropping
93	100KΩ	½		BTS-100K	Br.-Blk.-Yl. AF Plate Load
94	47KΩ	½		BTS-47K	Yl.-Vi.-Or. AF Plate Decoupling
95	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. Output Grid
96	270Ω	2		BW-2-270	Red-Vi.-Br. Output Cathode
97	470Ω	2		BT-2-470	Yl.-Vi.-Br. Headphone Shunt

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	NATIONAL PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
98	117V AC @ .68A or 240V AC	800V CT @ .095A	5.0V AC @ 2.0A	6.2V AC @ 4.2A		P-4080*#		

*Drill new mounting holes.
#This unit for 117V AC only.

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

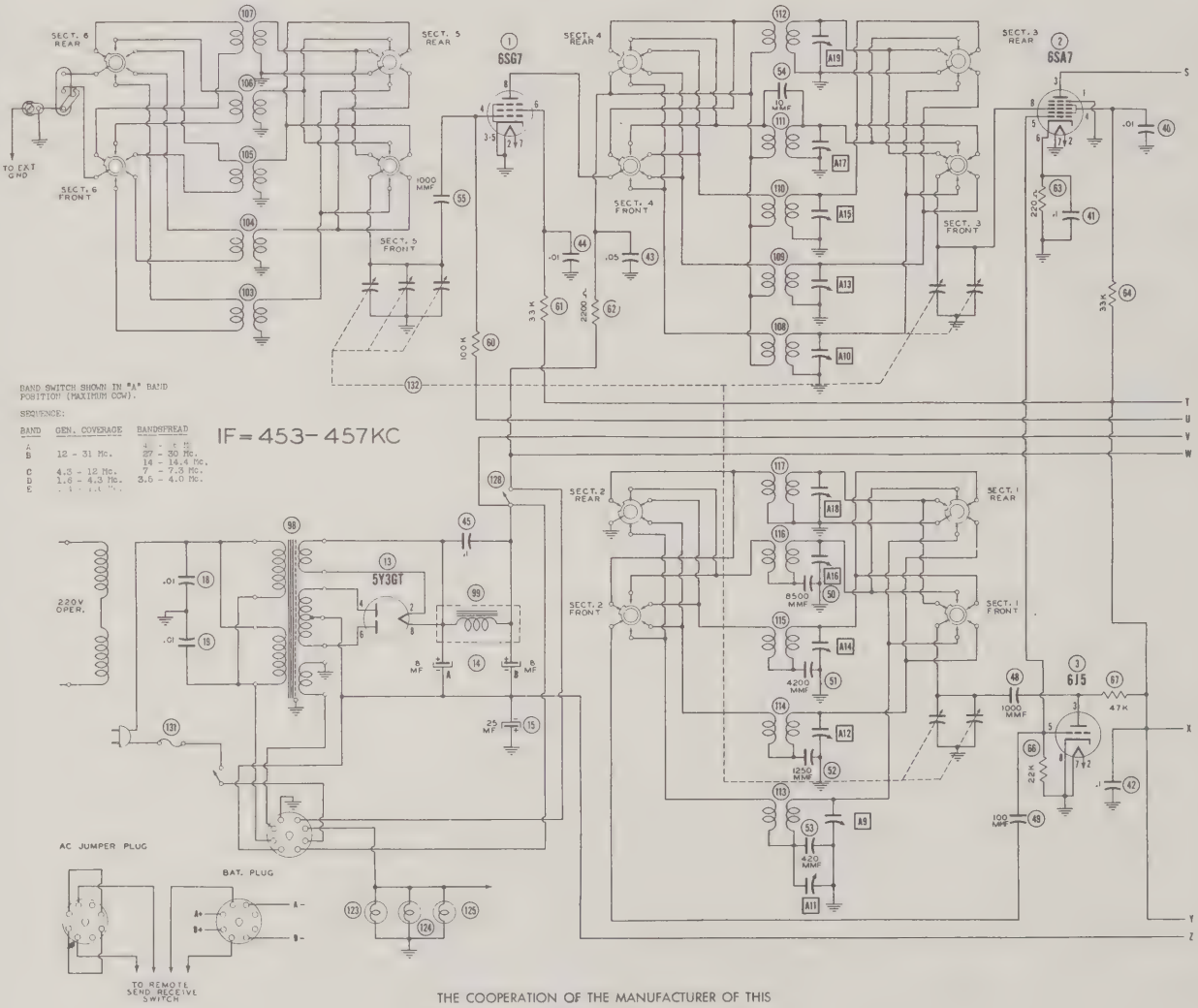
RMA Dummy consists of 200 MMFD cap. in series with 20 microhenry choke with choke shunted by 400MMFD cap. in series with 400Ω carbon resistor.

On all bands the oscillator should work above incoming signal. To check this in Steps 8, 10, 12 and 14 turn sig. generator 910KC above the alignment frequency. If signal does not come in retune signal generator to original alignment frequency and open trimmer to next peak. Adjust for maximum output and recheck for image.

Output of signal generator should be no higher than necessary to obtain output reading. Use an insulated alignment screwdriver for all adjustments.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	Direct	High side to center stator of tuning cap. Low side to chassis.	Approx. 455KC (unmodulated)	E	Turn tuning cap. fully open.	Across 500Ω terminals on output terminal strip.		Set RF Gain control to "10" and Tone control to "0", CWO switch to "ON", AVC-MVC switch to "MVC", phasing control to "0" selectivity switch to "5", AF gain control to "10", and CWO control set for audible note. Tune sig. gen. for maximum output. This will be somewhere between 453 & 457KC.
2	Direct	"	(unchanged)	"	"	"	A1,A2, A3,A4, A5,A6.	Turn selectivity and CWO switches to off. Turn modulation of sig. gen. ON. Adjust A1 through A6 for maximum output. using minimum signal from sig. gen. to prevent overloading of IF stages.
3	Direct	"	"	"	"	"	A7	Turn AVC-MVC switch to "AVC". Adjust A7 for a well defined dip in meter reading.
4	Direct	"	"	"	"	"	A8	Turn modulation of sig. gen. off. Turn CWO switch to "ON" and CWO control to "0". Adjust A8 for zero beat.
5	RMA Dummy	High side to ext. ant. terminal. Low side to chassis.	1500KC (modulated)	"	1500KC	"	A9	Set "trimmer" to minimum cap., turn AVC-MVC switch to "MVC", turn CWO switch to "OFF", AF Gain to "10" limiter to "OFF", selectivity to "OFF", RF Gain to "10" and bandspread dial to 180. Leave these controls and bandspread dial setting unchanged during remainder of alignment. Adjust A9 for maximum output.
6	"	"	1400KC	"	Tune for maximum output.	"	A10	Adjust for maximum output.
7	"	"	600KC	"	"	"	A11	Rock tuning cap. and adjust for maximum output. Repeat Steps 5, 6 & 7 until no further improvement can be made.
8	"	"	4.2MC	D	4.2MC	"	A12	Adjust for maximum output. Check for image per prealignment notes.
9	"	"	3.8MC	"	Tune for maximum output.	"	A13	Rock tuning cap. and adjust for maximum output.
10	"	"	11.5MC	C	11.5MC	"	A14	Adjust for maximum output. Check for image per prealignment notes.
11	"	"	11.0MC	"	Tune for maximum output.	"	A15	Rock tuning cap. and adjust for maximum output.
12	"	"	30.0MC	B	30.0MC	"	A16	Adjust for maximum output. Check for image per prealignment notes.
13	"	"	28.0MC	"	Tune for maximum output.	"	A17	Rock tuning cap. and adjust for maximum output.
14	"	"	56.0MC	A	Set bandspread dial to 56MC.	"	A18	Bandspread tuning cap. only is used on Band A. Turn main tuning cap. to minimum capacity. Adjust A18 for maximum output. Check for image per prealignment notes.
15	"	"	55.0MC	"	Tune for maximum output.	"	A19	Rock tuning cap. and adjust for maximum output.

DATE 5/48-#4910-13 SET #40-FOLDER #13



BAND SWITCH SHOWN IN "A" BAND POSITION (MAXIMUM CCW).

SEQUENCE:

BAND	GEN. COVERAGE	BANDSPREAD
A	[illegible]	[illegible]
B	12 - 31 Mc.	27 - 30 Mc. 14 - 14.4 Mc.
C	4.3 - 12 Mc.	7 - 7.3 Mc.
D	1.6 - 4.3 Mc.	3.5 - 4.0 Mc.
E	[illegible]	[illegible]

IF = 453 - 457KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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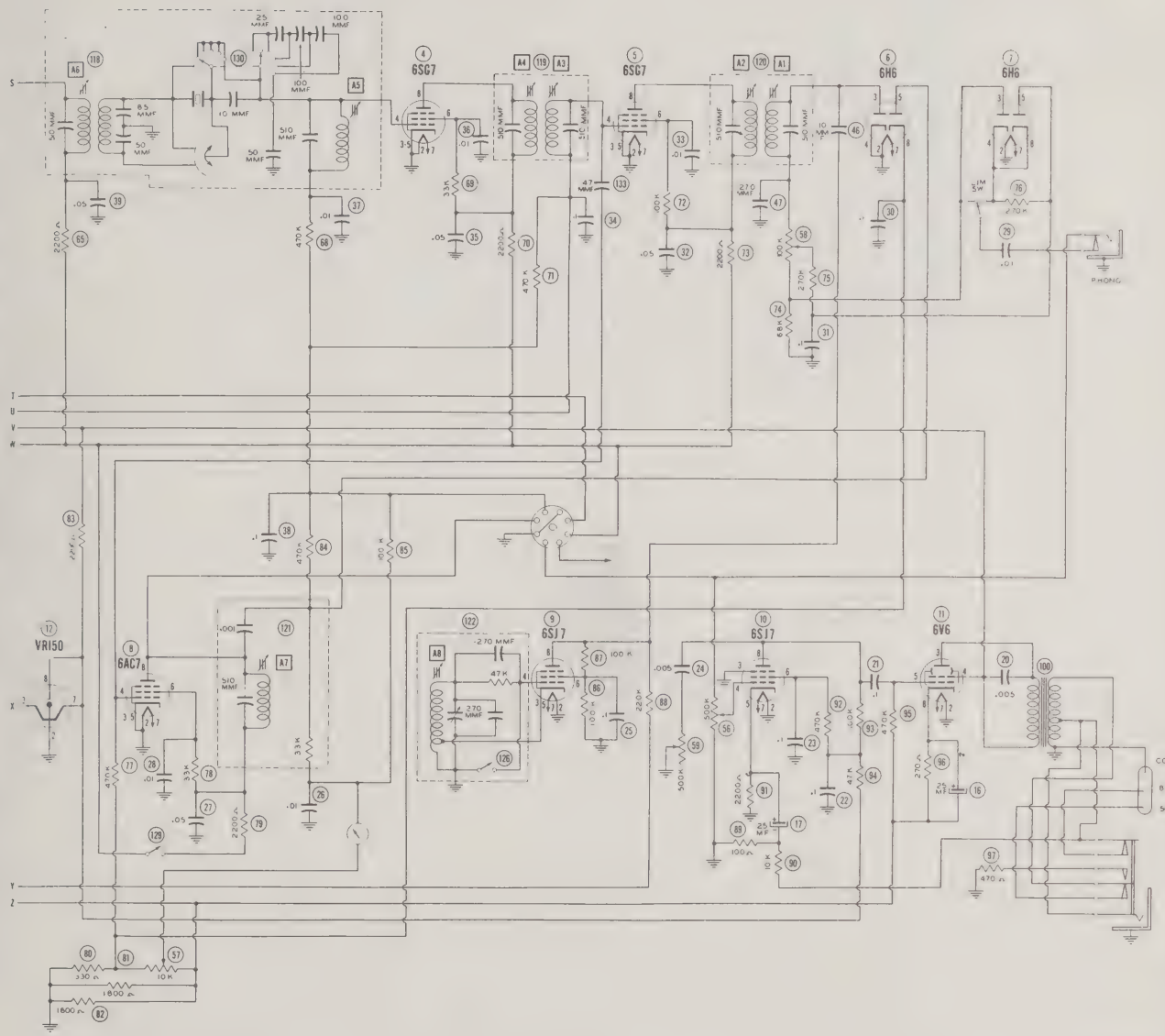
4810-13



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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4810-13

VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6SG7	0V.	0V.	0V.	-.6VDC	0V.	90VDC	6.2VAC	185VDC
2	6SA7	0V.	6.2VAC	190VDC	60VDC	-11VDC§	1VDC	0V.	0V.
3	6J5	0V.	6.2VAC	55VDC	0V.	-11VDC§	150VDC	0V.	0V.
4	6SG7	0V.	0V.	0V.	-.6VDC	0V.	110VDC	6.2VAC	175VDC
5	6SG7	0V.	0V.	0V.	-.6VDC	0V.	75VDC	6.2VAC	180VDC
6	6H6	0V.	0V.	-.7VDC	0V.	-1.7VDC	0V.	6.2VAC	-1.3VDC
7	6H6	0V.	0V.	-.4VDC	0V.	-.2VDC	0V.	6.2VAC	0V.
8	6AC7	0V.	0V.	0V.	-.7VDC	0V.	99VDC	6.2VAC	168VDC
** 9	6SJ7	0V.	0V.	0V.	-.1VDC	0V.	15VDC	6.2VAC	36VDC
10	6SJ7	0V.	0V.	0V.	0V.	1.6VDC	35VDC	6.2VAC	55VDC
11	6V6	0V.	0V.	180VDC	195VDC	-23VDC	0V.	6.2VAC	-30VDC
12	0D3/VR150	0V.	0V.	150VDC	0V.	150VDC	36VDC	150VDC	0V.C
13	5Y3GT	225VDC	225VDC	0V.	300VAC	0V.	300VAC	0V.	225VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6SG7	0Ω	0Ω	0Ω	700KΩ	0Ω	100KΩ	.1Ω	70KΩ
2	6SA7	0Ω	.1Ω	70KΩ	100KΩ	22KΩ	220Ω	0Ω	4.5Ω
3	6J5	0Ω	.1Ω	110KΩ	INF.	22KΩ	70KΩ	0Ω	0Ω
4	6SG7	0Ω	0Ω	0Ω	600KΩ	0Ω	100KΩ	.1Ω	70KΩ
5	6SG7	0Ω	0Ω	0Ω	600KΩ	0Ω	170KΩ	.1Ω	70KΩ
6	6H6	0Ω	0Ω	170KΩ	0Ω	33KΩ	INF.	.1Ω	330Ω
7	6H6	0Ω	0Ω	68KΩ	800KΩ	340KΩ	INF.	.1Ω	800KΩ
8	6AC7	0Ω	0Ω	0Ω	470KΩ	0Ω	100KΩ	.1Ω	70KΩ
** 9	6SJ7	0Ω	0Ω	0Ω	47KΩ	1Ω	80KΩ	.1Ω	180KΩ
10	6SJ7	0Ω	0Ω	0Ω	500KΩ	2.2KΩ	580KΩ	.1Ω	210KΩ
11	6V6	0Ω	0Ω	70KΩ	70KΩ	470KΩ	INF.	.1Ω	1KΩ
12	0D3/VR150	0Ω	0Ω	70KΩ	INF.	70KΩ	180KΩ	70KΩ	INF.
13	5Y3GT	70KΩ	70KΩ	INF.	120Ω	INF.	125Ω	INF.	70KΩ

** CWO SWITCH ON POSITION.
BAND SWITCH AT E.
SELECTIVITY CONTROL OFF.
REC.-SEND SWITCH IN RECEIVE.
AVC-MVC SWITCH AT AVC POSITION.
LIMITER CONTROL FULL ON POSITION.

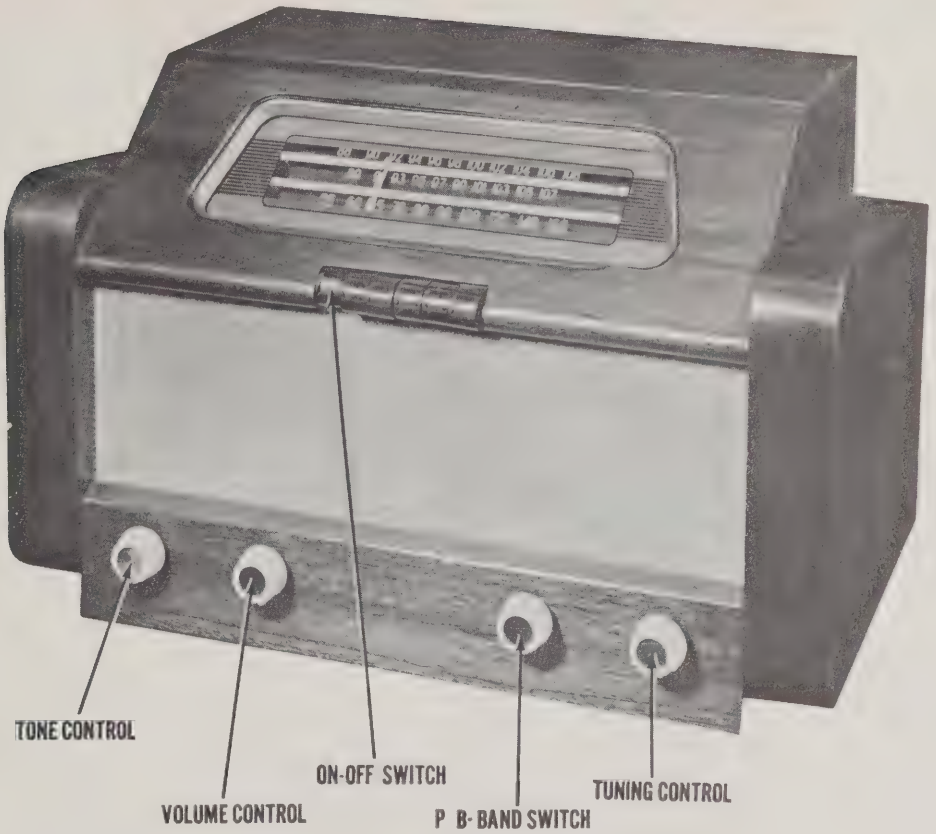
RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - RF Gain, AF Gain and Tone Control at maximum, no signal applied for voltage measurements.

STAGE GAIN MEASUREMENTS			
ANTENNA TO RF GRID	10X		600KC
RF GRID TO CONVERTER GRID	3X		600KC
CONVERTER GAIN	11X	IN	600KC
		OUT	453-457KC
INPUT IF	.25X		453-457KC
1st IF TUBE	130X		453-457KC
INTER. IF	.8X		453-457KC
2nd IF TUBE	80X		453-457KC
OUTPUT IF	.55X		453-457KC
AUDIO	35X		400 ∿
OUTPUT	20X		400 ∿

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by connecting negative (-) 3 volts to the AVC line. AVC-MVC switch on MVC position.

PHILCO MODEL
48-475



PHILCO MODEL 48-475

PHILCO MODEL
48-475

TRADE NAME	PHILCO MODEL 48-475
MANUFACTURER	Philco Corp., Tioga & "C" Sts., Philadelphia, Pa.
TYPE SET	AC Operated AM-FM Superheterodyne Receiver with Loop Antenna
TUBES (EIGHT)	Types, 6AG5 FM RF Amp., 7F8 Converter, 6BA6 1st IF Amp., 6BA6 2nd IF Amp., 6H6GT FM Det., 7C6 Det.-AVC-AF, 7B5 Power Output, 7Z4 Rectifier.
POWER SUPPLY	105-120 Volts AC — RATING .53 Amp. @ 117 Volts AC
TUNING RANGE -	540-1600KC — FREQ. MOD. 88-108MC

PUSHBUTTON ADJUSTMENTS

1. Ranges of pushbuttons reading from left to right are: 540-1000KC, 600-1200KC 650-1300KC, 850-1500KC and 900-1600KC.
2. Make up a list of desired stations ranging from low to high frequency.
3. Turn set on and allow it to warm up for at least fifteen minutes.
4. Turn band switch to BC and manually tune in station desired to be set up.
5. Turn band switch to P.B. and depress first button next to on-off button. Adjust B1 to tune in selected station, and B2 for maximum volume. This button is now set up.
6. Repeat the above procedure for the remaining buttons to be set up.

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

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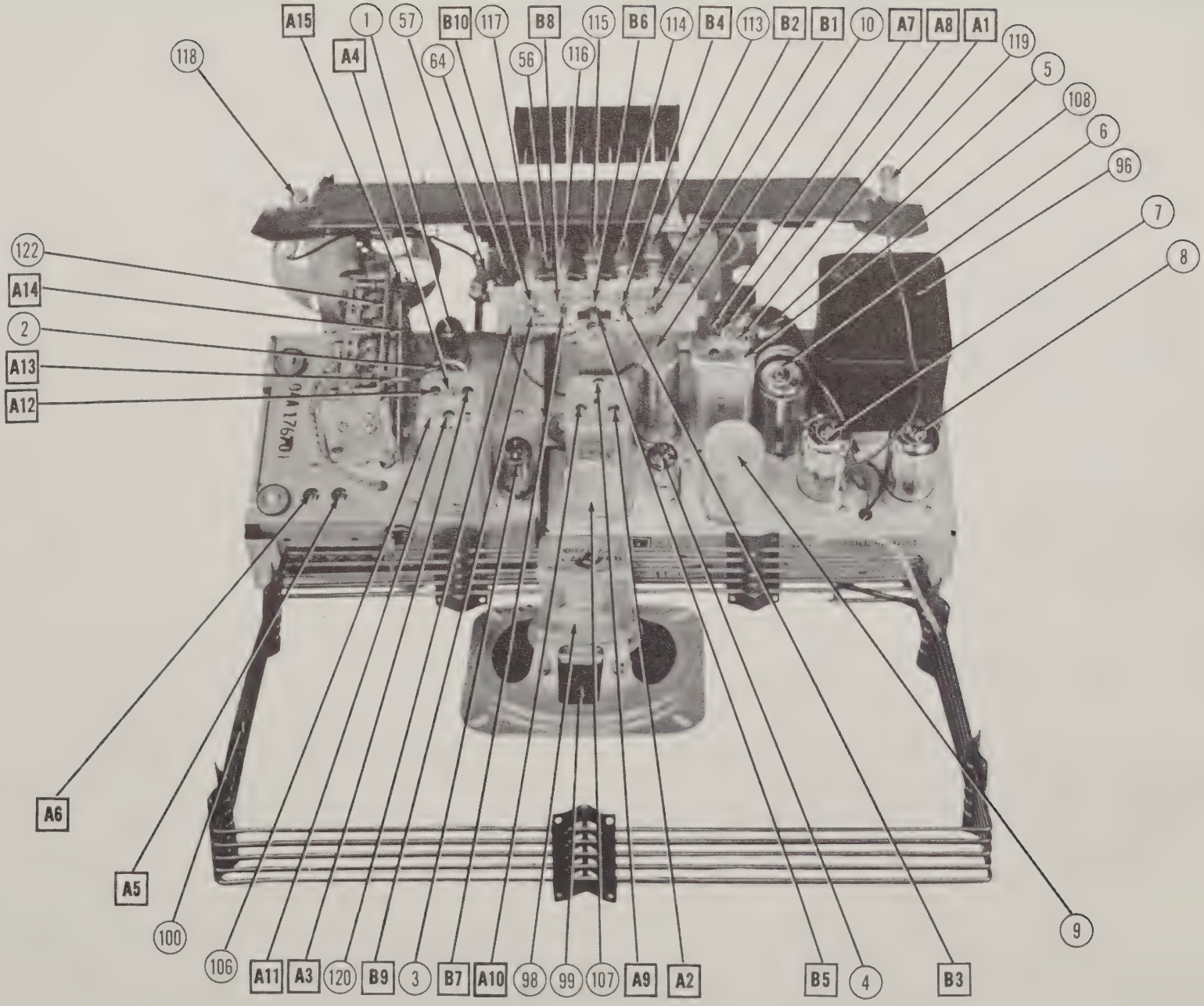
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A3
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B9
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B7
A10
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107
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B5
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B3
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PHILCO MODEL 48-475

PAGE 3

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	FM RF Amp.	6AG5	6AG5	7BD	
2	Converter	7F8	7F8	8BW	
3	1st IF Amp.	6BA6	6BA6	7BK	
4	2nd IF Amp.	6BA6	6BA6	7BK	
5	FM Det.	6H6GT	6H6GT	7Q	
6	Det.-AVC-AF	7C6	7C6	8W	
7	Power Output	7B5	7B5	6AE	
8	Rectifier	7Z4	7Z4	5AB	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
9A	30	450	30-2570-18					■ Filter
B	20	450			—			"
10A	20	450	30-2570-15	AF222J	UP15D145	DY-3x15-450	EL-344	■ "
B	10	450						▲ "
C	10	450						"
11	5	50	30-2417					Stabilizing Cap.
12	.01	600	61-0120	684-01	DT6S1	MPH-6-01	TC-11	Line Filter
13	.01	600	61-0120	684-01	DT6S1	MPH-6-01	TC-11	" "
14	.003	400	61-0109	484-003	DT6D3	ST-6-003	TC-23	Output Plate Bypass
15	.2	200	45-3500-3	464-.2	DT4P2	ST-4-.2	TC-2	Bias Filter
16	.006	400	45-3500-7	484-006	DT6D6	ST-6-006	TC-26	Audio Coupling
17	.006	400	45-3500-7	484-006	DT6D6	ST-6-006	TC-26	Tone Compensation
18	.006	400	45-3500-7	484-006	DT6D6	ST-6-006	TC-26	" "
19	.006	400	45-3500-7	484-006	DT6D6	ST-6-006	TC-26	Audio Coupling
20	.006	400	45-3500-7	484-006	DT6D6	ST-6-006	TC-26	" "
21	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	RF Bypass Pwr. Supply
22	.008	400	61-0174	484-0075	1W5T8	MO.3-38	MS-38	Diode Load Cap.
23	.05	400	61-0122	484-05	DT4S5	ST-4-05	TC-15	2nd IF Plate Decoup.
24	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	2nd IF Screen Bypass
25	.05	200	61-0122	484-05	DT4S5	ST-4-05	TC-15	2nd IF Cathode Bypass
26	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	1st IF Plate Decoup.
27	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	1st IF Screen Bypass
28	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	RF Bypass Pwr. Supply
29	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	AVC Filter
30	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	" "
31	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	Conv. Plate Decoup.
32	100	500	60-10105407	1468-0001	5W5T1	MO.5-31	1FM-31	AF Plate Bypass-Cer.
33	100	500	60-10105407	1468-0001	5W5T1	MO.5-31	1FM-31	Fil. Bypass - "
34	47	500	60-00515307	1468-00005	5W5Q5	MO.5-45	1FM-45	Tone Compensation
35	100	500	60-10105407	1468-0001	5W5T1	MO.5-31	1FM-31	RF Bypass-Cer.
36	100	500	60-10105407	1468-0001	5W5T1	MO.5-31	1FM-31	" " "
37	100	500	60-10105407	1468-0001	5W5T1	MO.5-31	1FM-31	Fil. Bypass-Cer.
38	7.5	500	30-1224-8					Neutralizing Cap.-Cer.
39	100	500	60-10105407	1468-0001	5W5T1	MO.5-31	1FM-31	IF Coupling-Cer.
40	220	500	62-122001001	1468-00025	5W5T25	MO.5-325	1FM-325	Diode RF Filter
41	100	500	60-10105407	1468-0001	5W5T1	MO.5-31	1FM-31	Filament Bypass-Cer.
42	100	500	60-10105407	1468-0001	5W5T1	MO.5-31	1FM-31	1st IF Plate Decoup.-Cer.
43	100	500	60-10105407	1468-0001	5W5T1	MO.5-31	1FM-31	Fil. Bypass-Cer.
44	100	500	60-10105407	1468-0001	5W5T1	MO.5-31	1FM-31	RF Bypass-Cer.
45	1500	300	60-215001011	1467-0015	1W5D15	MW.5-215	1FM-215	RF Bypass Pwr. Supply-Cer.
46	100	500	60-10105407	1468-0001	5W5T1	MO.5-31	1FM-31	Osc. Grid Bypass-Cer.
47	750	300	60-10755301	1468-00075	1W5T8	MO.3-38	1FM-37	Osc. Coupling-Cer.
48	100	500	60-10105407	1468-0001	5W5T1	MO.5-31	1FM-31	RF Bypass-Cer.
49	220	500	60-122001001	1468-00025	5W5T25	MO.5-325	1FM-325	Osc. Coupling-Cer.
50	220	500	60-122001001	1468-00025	5W5T25	MO.5-325	1FM-325	RF Coupling-Cer.
51	33	500	30-1224	1468-00004	5W5Q3	MO.5-43	MS-43	RF Coupling-Cer.
52	1500	300	60-215001011	1467-0015	1W5D15	MW.5-215	1FM-215	RF Plate Decoup.-Cer.
53	1500	300	60-215001011	1467-0015	1W5D15	MW.5-215	1FM-215	RF Screen Bypass-Cer.
54	100	500	60-10105407	1468-0001	5W5T1	MO.5-31	1FM-31	RF Cathode Bypass-Cer.
55	100	500	60-10105407	1468-0001	5W5T1	MO.5-31	1FM-31	Fil. Bypass-Cer.
56	220	500	60-122001001	1468-00025	5W5T25	MO.5-325	1FM-325	Oscillator Feedback-Cer.
57	1000	300	30-1225	1468-001	1W5D1	MO.3-21	1FM-21	Osc. Cathode Bypass-Cer.
123	100	500	60-10105407	1468-0001	5W5T1	MO.5-31	1FM-31	Filament Bypass-Cer.

PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS: FIELD	RATINGS: VC IMP.	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: JENSEN PART No.	REPLACEMENT DATA: QUAM PART No.	INSTALLATION NOTES
98	PM	3.8Ω	36-1507-3		52A21	
	CONE DIA.	VC DIA.				
99	5"	3/4"				

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: MEISSNER PART No.
100	BC Loop Ant.		.2Ω	76-3142	
101	BC Ant. Coil		1.2Ω	32-4033-4	
102	FM Ant. Coil		0Ω	32-4158-1	
103	FM RF Coil		0Ω	32-4159-1	
104	BC Osc. Coil		2.4Ω	32-4019-7	
105	FM " "		0Ω	32-4018-4	
106	1st IF Trans.	2.8Ω	19.3Ω	32-4146-2	
107	2nd IF "	6Ω	12.8Ω	32-4156-2	
108	3rd IF "	11Ω	11Ω	32-4147-1	
109	RF Plate Choke		.4Ω	32-4157-2	
110	RF Choke		.4Ω	32-4061-1	
111	" "		.4Ω	32-4061-1	
112	" "		.5Ω	32-4061-2	
113	PB Osc.Coil		3.8Ω	32-4059-2	
114	" " "		3.8Ω	32-4059-2	
115	" " "		3.8Ω	32-4059-2	
116	" " "		3.8Ω	32-4059-2	
117	" " "		3.8Ω	32-4059-2	

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA:	INSTALLATION NOTES
118	Bayonet	7.5	0.2	White	34-2040		Type 51
119	"	"	"	"	34-2040		" "

MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
120	Switch	42-1758-1	Pushbutton
121	"	42-1819	Band
122	Tuning Gang	31-2724	(15-450MMF, 15-242MMF)
A5 }	Trimmer Strip	31-6476-8	{BC Osc. Adj.
A6 }			{BC Ant. Adj.
	Dial Scale	27-5972	
	Dial Pointer	56-3179-3	
	Knob	54-4375	Control

PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	PHILCO PART No.	IRC PART No.	CLAROSTAT PART No.	
58A	2 Meg.	½	33-5535-11	D18-139X	T-116	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 58A per instructions
59	4 Meg.	½	33-5539-23			Tone Control

RESISTORS

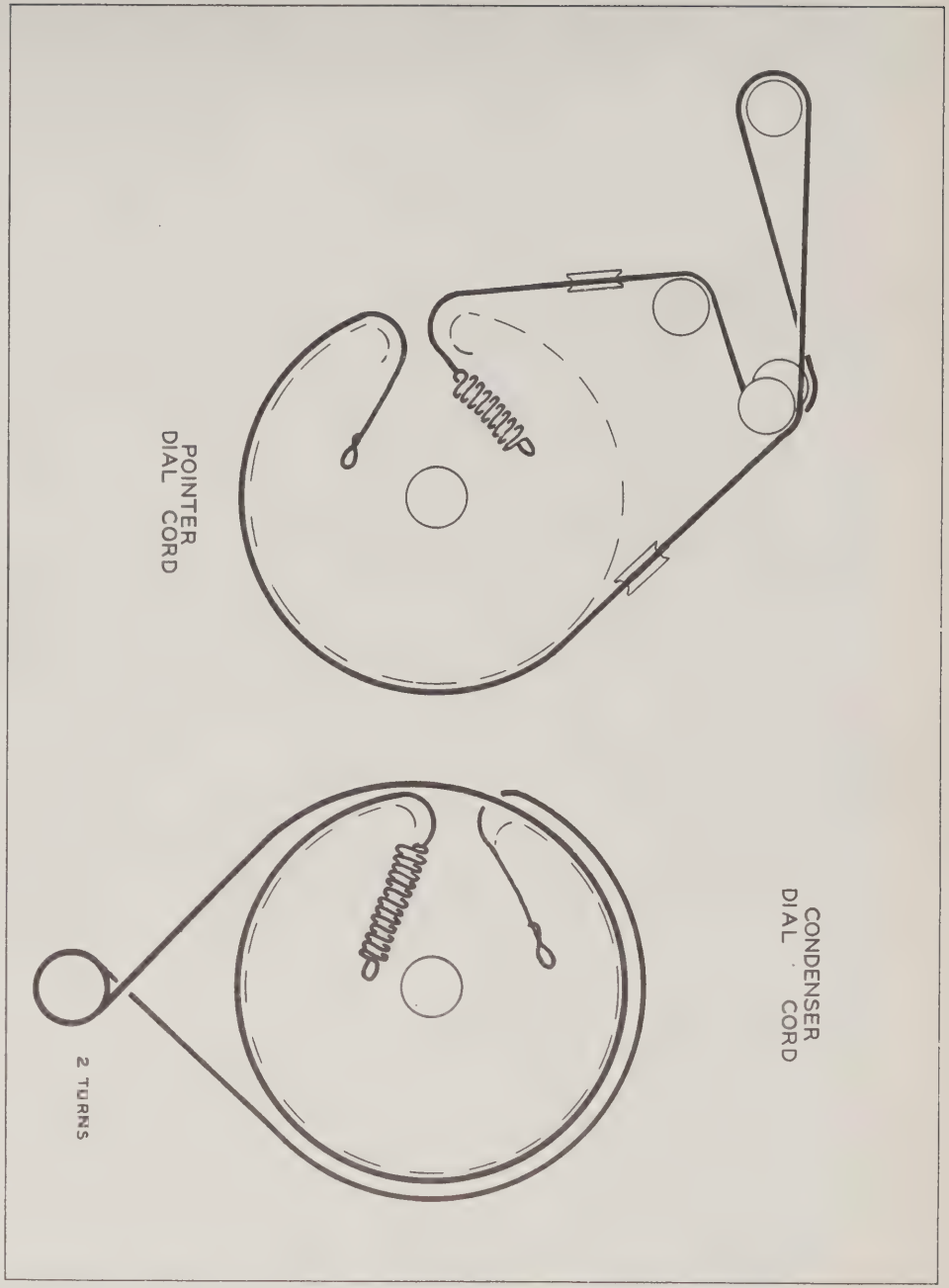
ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	PHILCO PART No.	IRC PART No.	
60	10Ω	½	66-0103340	BW-½-10	Br.-Blk.-Blk. Parasitic Suppressor
61	150Ω	½	66-1153340	BW-½-150	Br.-Grn.-Br. FM RF Cathode
62	82KΩ	½	66-3823340	BTS-82K	Gray-Red-Or. FM RF Screen
63	1000Ω	½	66-2103340	BTS-1000	Br.-Blk.-Red FM RF Plate Decoupling
64	6800Ω	½	66-2683340	BTS-6800	Blue-Gray-Red Osc. Cathode
65	1500Ω	½	66-2153340	BTS-1500	Br.-Grn.-Red Mixer Cathode
66	2.2 Meg.	½	66-5223340	BTS-2.2 Meg.	Red-Red-Grn. Mixer Grid
67	470KΩ	½	66-4473340	BTS-470K	Yl.-Vi.-Yl. AVC Network
68	15KΩ	½	66-3153340	BTS-15K	Br.-Grn.-Or. Oscillator Grid
69	1500Ω	½	66-2153340	BTS-1500	Br.-Grn.-Red Parasitic Suppressor
70	47KΩ	½	66-3473340	BTS-47K	Yl.-Vi.-Or. Mixer Plate Dropping
71	27KΩ	½	66-3273340	BTS-27K	Red-Vi.-Or. Osc. Plate Load
72	2.2 Meg.	½	66-5223340	BTS-2.2 Meg.	Red-Red-Grn. 1st IF Grid
73	68Ω	½	66-0683340	BW-½-68	Blue-Gray-Blk.. 1st IF Cathode
74	22KΩ	½	66-3223340	BTS-22K	Red-Red-Or. 1st IF Screen
75	1000Ω	½	66-2103340	BTS-1000	Br.-Blk.-Red 1st IF Plate Decoupling
76	68Ω	½	66-0683340	BW-½-68	Blue-Gray-Blk. 2nd IF Cathode
77	22KΩ	½	66-3223340	BTS-22K	Red-Red-Or. 2nd IF Screen
78	1000Ω	½	66-2103340	BTS-1000	Br.-Blk.-Red 2nd IF Plate Decoupling
79	330KΩ	½	66-4333340	BTS-330K	Or.-Or.-Yl. Diode Load
80	100KΩ	½	66-4103340	BTS-100K	Br.-Blk.-Yl. Diode Filter
81	100KΩ	½	66-4103340	BTS-100K	Br.-Blk.-Yl. De-emphasis
82	6.8 Meg.	½	66-5683340	BTS-6.8 Meg.	Blue-Gray-Grn. FM Det. Load
83	3.3 Meg.	½	66-5333340	BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
84	1 Meg.	½	66-5103340	BTS-1 Meg.	Br.-Blk.-Grn. " "
85	47KΩ	½	66-3473340	BTS-47K	Yl.-Vi.-Or. Ratio Det. Diode Load
86	8.2 Meg.	½	66-5823340	BTS-8.2 Meg.	Gray-Red-Grn. AF Grid
87	220KΩ	½	66-4223340	BTS-220K	Red-Red-Yl. AF Plate Load
88	33KΩ	½	66-3333340	BTS-33K	Or.-Or.-Or. Tone Comp.
89	470KΩ	½	66-4473340	BTS-470K	Yl.-Vi.-Yl. Output Grid
90	150KΩ	½	66-4153340	BTS-150K	Br.-Grn.-Yl. Bias Filter
91	100KΩ	½	66-4103340	BTS-100K	Br.-Blk.-Yl. RF Filter
92	10KΩ	2	66-3103340	BT-2-10K	Br.-Blk.-Or. Voltage Dropping
93	1500Ω	2	66-2155340	BT-2-1500	Br.-Grn.-Red Filter
94	1000Ω	2	66-2105340	BT-2-1000	Br.-Blk.-Red "
95	220Ω	2	66-1225340	BW-2-220	Red-Red-Br. Bias

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	PHILCO PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
96	117V AC @ .53A	570V CT @ .073A	6.5V AC @ 3.4A		32-8234			P-3151

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		PHILCO PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
97	7000Ω	3.5Ω	500Ω	.4Ω	27-6138	A-3876	T22S47	A-2931	



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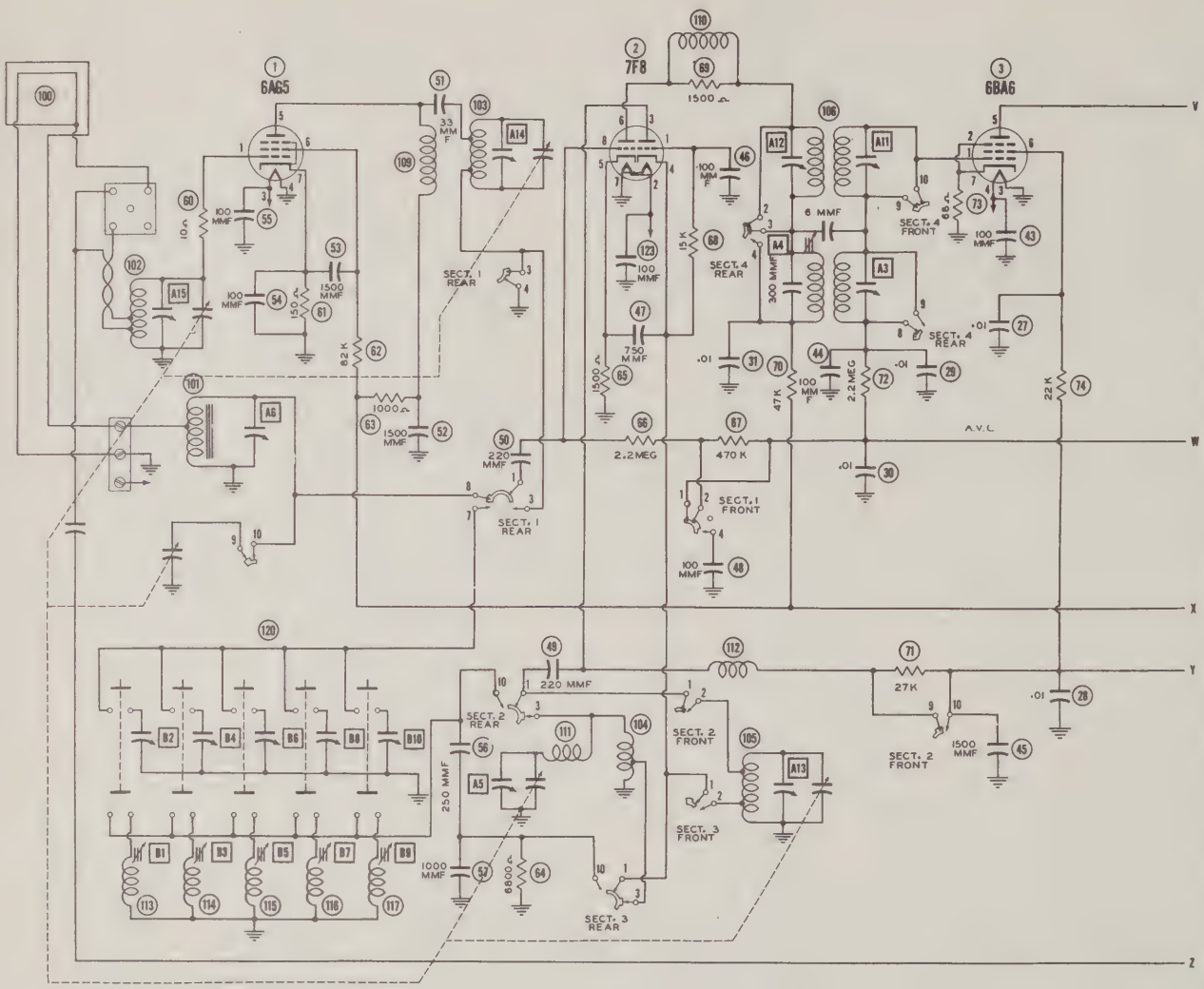
SET #40-FOLDER #14



IF=455KC AM

IF=9.1 MC FM

VOLTAGE READINGS — VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
‡ 1	6AG5	0V.	1VDC	6.5VAC	0V.	220VDC	121VDC	1VDC	-
2	7F8	-4.6VDC	6.5VAC	6.3VDC	0V.	2.5VDC	173VDC	0V.	-1.2VDC
3	6BA6	0V.	0V.	6.5VAC	0V.	220VDC	112VDC	.9VDC	-
4	6BA6	0V.	0V.	6.5VAC	0V.	220VDC	112VDC	1VDC	-
‡ 5	6H6GT	0V.	0V.	-.2VDC	0V.	-.6VDC	6.5VAC	6.5VAC	-.2VDC
6	7Q6	6.5VAC	120VDC	-.3VDC	0V.	-.4VDC	-.5VDC	0V.	0V.
7	7B5	0V.	247VDC	230VDC	-15.5VDC	-14VDC	-11VDC	0V.	6.5VAC
8	7Z4	6.5VAC	0V.	285VAC	0V.	0V.	285VAC	280VDC	0V.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
‡ 1	6AG5	10Ω	150Ω	.1Ω	0Ω	80KΩ	160KΩ	150Ω	-	
2	7F8	15KΩ	.1Ω	120KΩ	.5Ω	1.5KΩ	130KΩ	0Ω	6.5 Meg.	
3	6BA6	6.5 Meg.	0Ω	.1Ω	0Ω	80KΩ	110KΩ	68Ω	-	
4	6BA6	12.6Ω	0Ω	.1Ω	0Ω	80KΩ	110KΩ	68Ω	-	
‡ 5	6H6GT	INF.	0Ω	6.8 Meg.	0Ω	47KΩ	.1Ω	.1Ω	6.8 Meg.	
6	7Q6	.1Ω	300KΩ	10 Meg.	0Ω	330KΩ	1 Meg.	0Ω	0Ω	
7	7B5	0Ω	80KΩ	80KΩ	220Ω	150KΩ	620KΩ	0Ω	.1Ω	
8	7Z4	.1Ω	INF.	400Ω	INF.	0Ω	410Ω	80KΩ	0Ω	

‡ VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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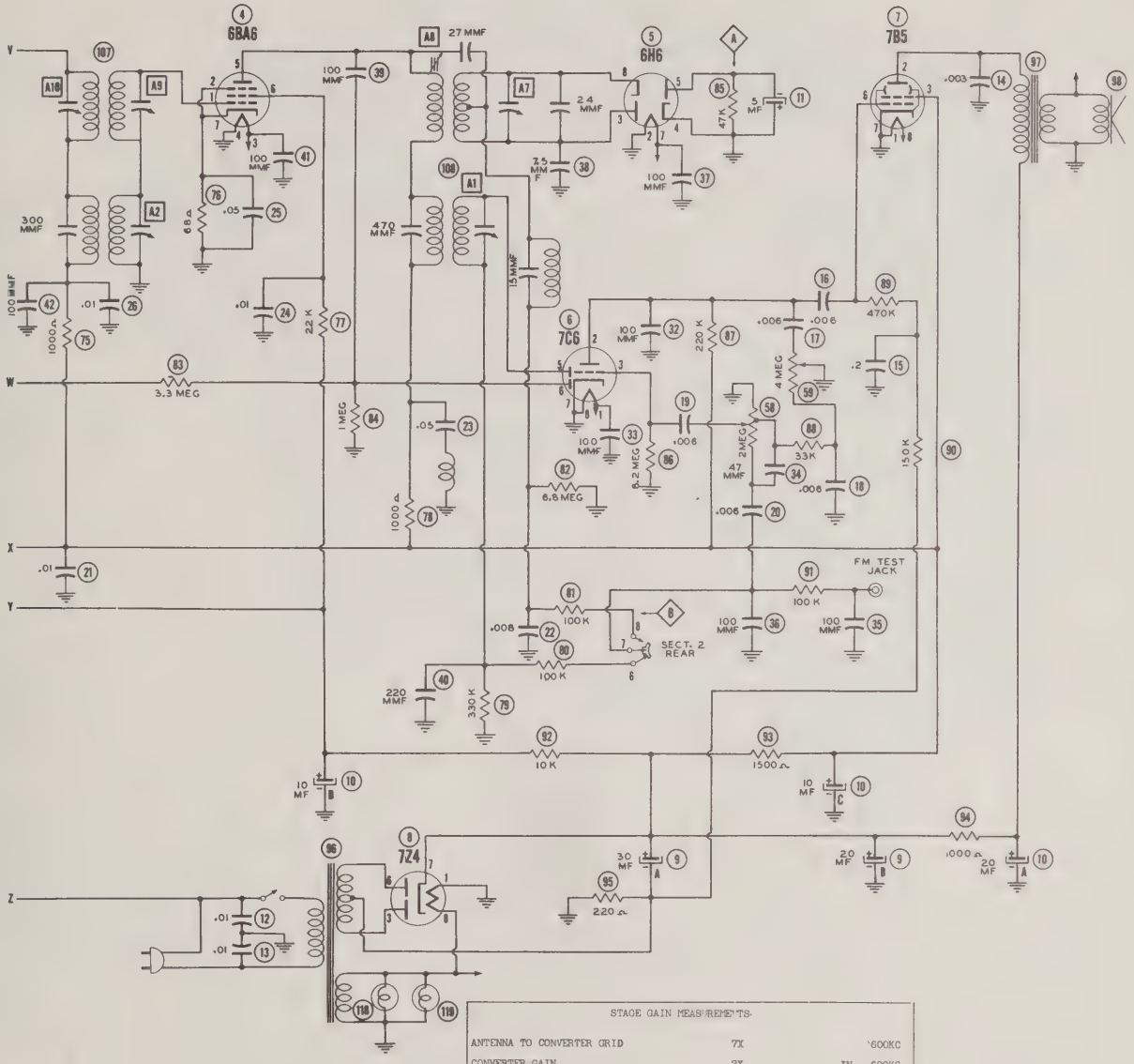
4810-14

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.



STAGE GAIN MEASUREMENTS		
ANTENNA TO CONVERTER GRID	7X	600KC
CONVERTER GAIN	2X	IN 600KC OUT 455KC
INPUT IF TRANSFORMER	3X	455KC
1st IF TUBE	15X	455KC
INTER. IF TRANS.	9X	455KC
2nd IF TUBE	40X	455KC
OUTPUT IF TRANSFORMER	1X	455KC
AUDIO	35X	400 ∿
OUTPUT	18X	400 ∿

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer 2-13/16" from left edge of dial backplate. This is the calibration mark referred to below.
Use insulated alignment screwdriver for all adjustments.

AM ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to terminal 1 of ant. terminal strip. Low side to chassis.	455KC	BC (center)	Tuning cap. fully closed.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output in order given. Do not repeat.
2		Loop	1600KC	"	5-7/8" from calibration mark.	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3	.1 MFD.	"	1400KC	"	Tune for max. output.	"	A6	Adjust for maximum output. Repeat Steps 2 & 3 until no further improvement can be made.

FM ALIGNMENT

Complete AM alignment must be done prior to FM alignment.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR VTVM & OUTPUT METER

If a VTVM is not available a 20KΩ per volt DC voltmeter may be used as an output indicator.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4	.1 MFD.	High side to Pin 1 (Grid) of 6BA6 1st IF Tube (3). Low side to chassis.	9.1MC (Amplitude modulation)	FM (fully clockwise)	Tuning cap. fully closed	DC probe to Point (A). Common to chassis.	A7,A8, A9,A10	Adjust for maximum deflection. Repeat until no further improvement can be made.
5	.1 MFD.	High side to Pin 8 (grid) of 7F8. Low side to chassis.	"	"	"	"	A11, A12	Adjust for maximum deflection. Repeat until no further improvement can be made. Do not disturb A11 & A12 once this Step is completed.
	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
6	.1 MFD.	High side to Pin 8 (grid) of 7F8. Low side to chassis.	9.1MC (Amplitude modulation)	FM (fully clockwise)	Tuning cap. fully closed	Across voice coil	A7	Adjust for minimum output. Continue with FM-RF Alignment in Step 7.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use freq. modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	SCOPE CONNECT	ADJUST	REMARKS
4	.01 MFD.	High side to Pin 1 (grid) of 6BA6 1st IF Tube (3). Low side to chassis.	9.1MC (Freq. mod.)	FM (fully clockwise)	Tuning cap. fully closed.	Vertical input to Point (A). Ground to chassis.	A8,A9, A10	Disconnect 5 MFD cap. from Point (A). Adjust for maximum amplitude, symmetry and coincidence of pattern per Fig. 1.
5	.01 MFD	High side to Pin 8 (grid) of 7F8. Low side to chassis.	"	"	"	"	A11, A12	Adjust for maximum amplitude, symmetry and coincidence of pattern per Fig. 1.
6	.01 MFD	"	"	"	"	Vertical input to Point (B). Ground to chassis.	A7	Reconnect 5 MFD cap. to Point (A). Adjust for maximum straightness of crossover lines with crossover occurring at center of pattern per Fig. 2. Continue with FM-RF Alignment in Step 7.

FM RF ALIGNMENT

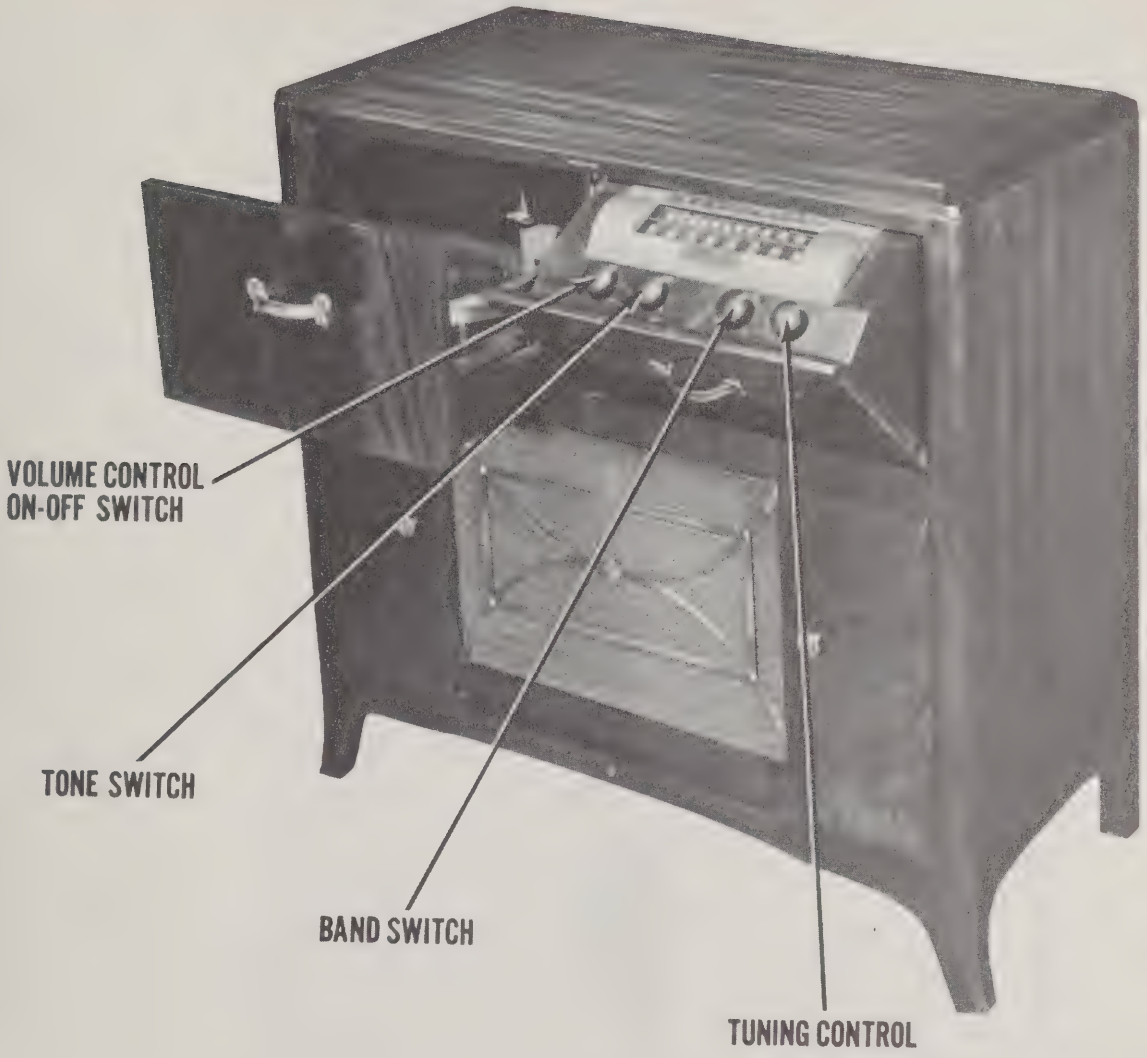
In Steps 9, 10 and 11 use tuning wand for adjustment of coils. Insert powdered iron end of wand into coil. If meter deflection increases compress turns slightly. Insert brass end of wand into coil. If meter deflection increases spread turns slightly. Correct adjustment is indicated when insertion of either end of wand causes a decrease in meter deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	SCOPE CONNECT	ADJUST	REMARKS
7	Direct	High side to terminal 4 of FM antenna socket. Low side to chassis.	105MC (Amp. modulation)	FM	4-3/4" from calibration mark.	DC probe to Point (A). Common to chassis	A13	Adjust for maximum deflection.
8	Direct	"	"	"	Tune for maximum deflection.	"	A14, A15	Rock tuning cap. and adjust for maximum deflection.
9	Direct	"	92MC	"	1-11/16" from calibration mark.	"	FM Osc. Coil (105)	Adjust per prealignment notes.
10	Direct	"	"	"	Tune for maximum deflection.	"	FM RF Coil (103)	"
11	Direct	"	"	"	"	"	FM Ant. Coil (102)	Adjust per prealignment notes. Repeat Steps 7, 8, 9, 10 and 11 until no further improvement can be made.

FIG. 1

FIG. 2

RCA MODEL
710V2 (Ch. RC-613A)



RCA MODEL
710V2 (Ch. RC-613A)

RCA (VICTOR) MODEL 710V2

TRADE NAME	RCA (Victor), Model 710V2 (Ch. RC-613A)		
MANUFACTURER	RCA Victor Div., Radio Corp. of America, Camden, N.J.		
TYPE SET	AC Operated Combination Phono-Radio AM-FM Superheterodyne Receiver		
TUBES (TEN)	Types, 6BE6 AM Converter, 6BE6 FM Converter, 6BA6 IF Amp., 6AU6 Driver, 6AL5 Ratio Det., 6SQ7 Det.-AVC-Phase Inv., 6SQ7 AF Amp., (2) 6K6GT Power Output, 5Y3GT Rectifier.		
POWER SUPPLY	105-125 Volts AC	RATING	.68 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1600KC	FREQ. MOD.	88-108MC

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

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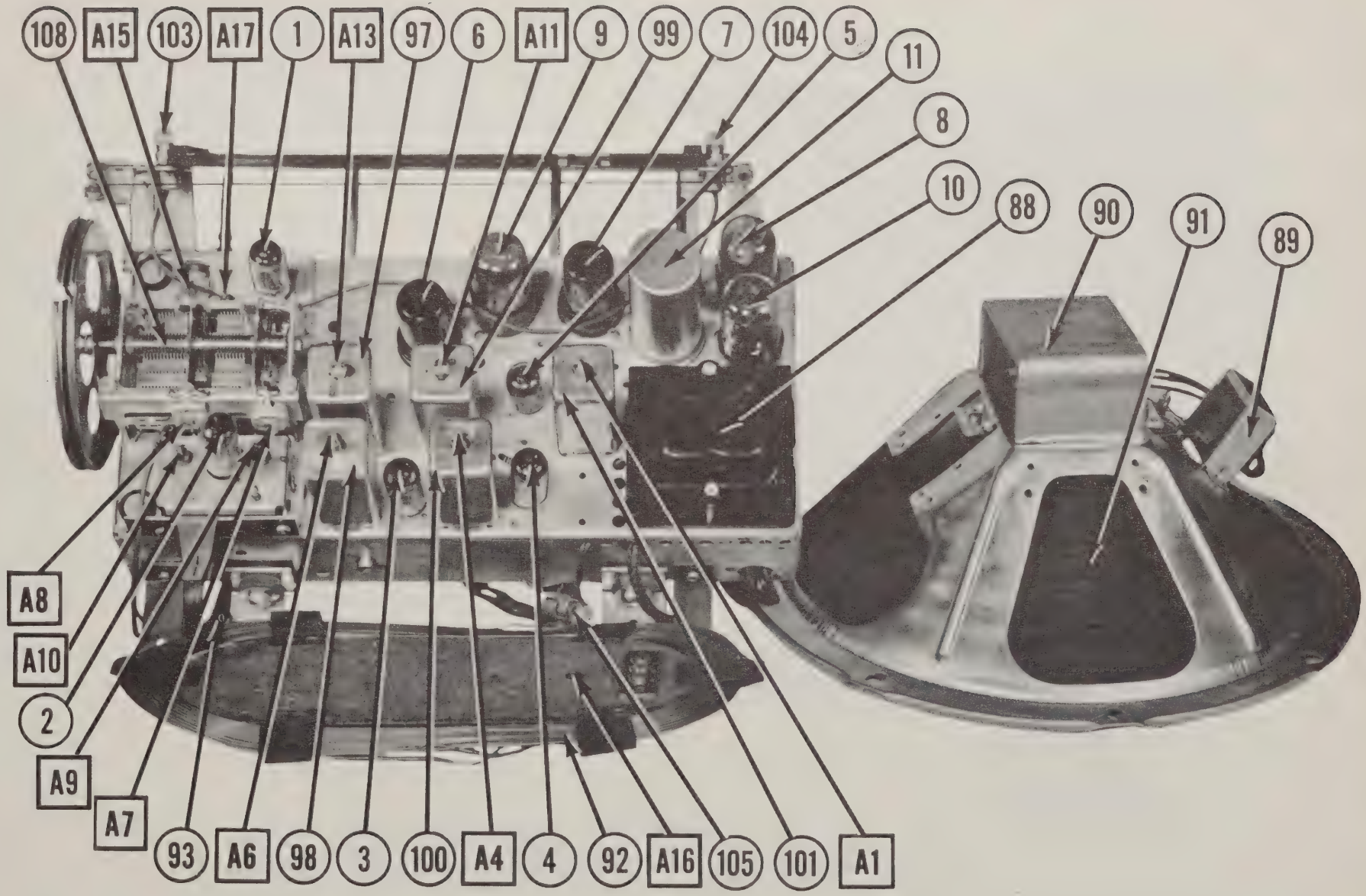
DATE 5/48-#4810-15 SET #40-FOLDER #15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A16
105
101
A1

A2
A3
A12
A5
A14
A
B
9-1SP503

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: RCA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	AM Converter	6BE6	6BE6	7CH	
2	FM Converter	6BE6	6BE6	7CH	
3	IF Amp.	6BA6	6BA6	7BK	
4	Driver	6AU6	6AU6	7BK	
5	Ratio Det.	6AL5	6AL5	6BT	
6	Det.-AVC-Phase Inverter	6SQ7	6SQ7	8Q	
7	AF Amp.	6SQ7	6SQ7	8Q	
8	Power Output	6K6GT	6K6GT	7S	
9	" "	6K6GT	6K6GT	7S	
10	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: RCA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
11A	30	450	72052	AF88J4A	UP4445C	DY-313	EL-330	● Filter
B	30	350						■ "
C	40	25						▲ Output Cathode Bypass
12	5	50	72121	PRS150-4	BR550	M-4-450	TA-55	Stabilizing Cap.
13	.003	600	72874	684-003	DT6D3	ST-6-003	TC-23	Line Filter
14	.0035	1200	70646	684-003	DT6D3	ST-6-003	TC-23	Output Plate Bypass
15	.0035	1200	70646	684-003	DT6D3	ST-6-003	TC-23	" " "
16	.01	400	71925	484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
17	.02	400	70611	484-02	DT4S2	ST-4-02	TC-12	" "
18	.005	400	71553	484-005	DT6D5	ST-6-005	TC-25	" "
19	.005	400	71553	484-005	DT6D5	ST-6-005	TC-25	" " -See Note 1
20	.015	200	72120	484-015	DT4S15	ST-6-02	TC-12	Tone Compensation
21	.015	200	72120	484-015	DT4S15	ST-6-02	TC-12	" "
22	.003	400	72573	484-003	DT6D3	ST-6-003	TC-23	" "
23	.005	400	71553	484-005	DT6D5	ST-6-005	TC-25	Audio Coupling
24	.001	400	73186	484-001	DT6D1	ST-6-001	TC-21	Tone Compensation
25	.005	400	71553	484-005	DT6D5	ST-6-005	TC-25	AVC Filter
26	.005	200	72490	484-005	DT6D5	ST-6-005	TC-25	RF Bypass
27	.005	200	72490	484-005	DT6D5	ST-6-005	TC-25	De-emphasis
28	.005	200	72490	484-005	DT6D5	ST-6-005	TC-25	RF Bypass
29	.05	200	71551	484-05	DT4S5	ST-4-05	TC-15	AVC Filter
30	.005	400	71553	484-005	DT6D5	ST-6-005	TC-25	Driver Plate Decoup.
31	.005	400	71553	484-005	DT6D5	ST-6-005	TC-25	Driver Screen Bypass
32	.01	400	71925	484-01	DT4S1	ST-4-01	TC-11	RF Bypass Pwr. Supply
33	.005	400	71553	484-005	DT6D5	ST-6-005	TC-25	Driver Cathode Bypass
34	.005	400	71553	484-005	DT6D5	ST-6-005	TC-25	IF Plate Decoup.
35	.005	400	71553	484-005	DT6D5	ST-6-005	TC-25	IF Screen Bypass
36	.01	400	71925	484-01	DT4S1	ST-4-01	TC-11	FM Conv. Decoup.
37	.01	400	71925	484-01	DT4S1	ST-4-01	TC-11	AM Conv. Screen Bypass
38	.01	200	71923	484-01	DT4S1	ST-4-01	TC-11	Fil. Bypass
39	120	300	71614	1468-0001	5W5T1	MO.5-31	1FM-31	AF Plate Bypass-Cer.
40	330	500	39640					Diode Load Cap.-See Note 2
41	330	500	39640					" " " " " "
42	330	500	39640	1468-00035	5W5T3	MO.5-33	1FM-335	FM Conv. Screen Bypass
43	27	300	72570	1468-00025	5W5J3	MO.5-43	MS-43	FM Osc. Grid Cap.-Cer.
44	47	300	39642	1468-00005	5W5Q5	MO.5-45	1FM-45	Fil. Bypass-Cer.
45	390	500	39642					Fixed Pad-Silver
46	56	300	71624	1468-00005	5W5Q5	MO.5-45	1FM-45	AM Osc. Grid Cap.-Cer.
47	120	300	71614	1468-00015	5W5T15	MO.5-51	1FM-315	RF Coupling-Cer.

Note 1-Some models use .01 in this application. Replacements same as Item #16.
Note 2-Items 40 & 41 must be of same value. If either must be replaced with a cap. of different value then the other must be replaced also.

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: RCA PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	INSTALLATION NOTES
89	15000 Ω CT	2.2Ω	620 Ω CT	.6Ω	37899	A-3823	T22874#	A-2901	#Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: RCA PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
90A	FIELD: PM	VC IMP.: 2.2Ω	71961	ST-102‡ Mod. P12-S	12A4‡	‡Replace output transformer to match 6-8Ω voice coil. Original Part No. 92569-1W1
91A	CONE DIA.: 12"	VC DIA.: 1"	36145			
90B	FIELD:	VC IMP.:				Alternate 6Ω Speaker. Original Part No. 92569-1W2
91B	CONE DIA.:	VC DIA.:	72828			

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: RCA PART No.	MEISSNER PART No.
92	Loop Ant.	.1Ω	.6Ω	73108	
93	FM Dipole			72555	
94	FM Ant.Coil	0Ω	0Ω	72335	
95	BC Osc.Coil		4Ω	72333	
96	FM " "		0Ω	72336	
97	AM 1st IF	12Ω	12Ω	71625	
98	FM " "	.5Ω	.6Ω	72887	
99	AM 2nd IF	8Ω	8Ω	71631	
100	FM 2nd IF	1.2Ω	.5Ω	72886	
101	Ratio Det.	.1Ω	.1Ω	72889	
102	Fil. Choke		0Ω	72574	

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: RCA PART No.	REPLACEMENT DATA:	INSTALLATION NOTES
103-105	Bayonet	7.5	0.2	White	11765		Type 51

MISCELLANEOUS

ITEM No.	PART NAME	RCA PART No.	NOTES
106	Switch	72060	AM-FM-Phono
107	"	71603	Tone
108	Tuning Gang	72058	(26-368MMF, 13-368MMF)
A7	Trimmer	72046	FM Osc. Adj.
A8	"	71606	FM Ant. Adj.
A15	"	72334	BC Osc. Adj.
	Dial Scale	72682	Glass
	Dial Pointer	71606	
	Knob	71621	Control

PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	RCA PART No.	IRC PART No.	CLAROSTAT PART No.	
48A	1.5 Meg.	½	70342	D18-139XX	T-95	Volume Control tapped @ 250KΩ & 500KΩ
B	Shaft		Not Req.	A	Not Req.	Attach to 48A per instructions
C	Switch		" "	41	SW-A	" " " " "

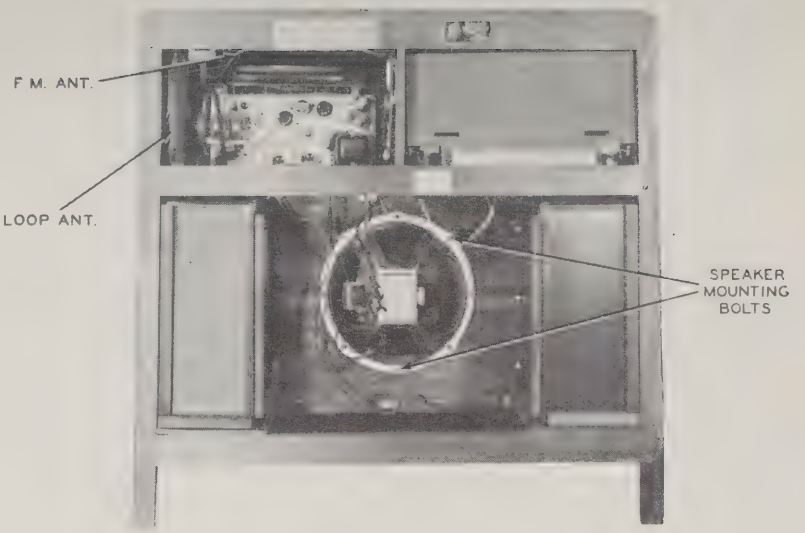
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	RCA PART No.	IRC PART No.	
49	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. FM Antenna Loading
50	22KΩ	½		BTS-22K	Red-Red-Or. FM Oscillator Grid
51	22KΩ	½		BTS-22K	Red-Red-Or. AM Oscillator Grid
52	2.2 Meg.	½		BTS-2.2 Meg	Red-Red-Grn. AM Converter Grid
53	18KΩ	2		BT-2-18K	Br.-Gray-Or. AM Converter Screen Dropping
54	8200Ω	1		BTA-8200	Gray-Red-Red FM Converter Screen Dropping
55	6800Ω	1		BTA-6800	Blue-Gray-Red FM Converter Screen Dropping
56	1000Ω	½		BTS-1000	Br.-Blk.-Red FM Converter Decoupling
57	47Ω	½			Yl.-Vi.-Blk. IF Cathode
58	22KΩ	1		BTA-22K	Red-Red-Or. IF Screen Dropping
59	2200Ω	1		BTA-2200	Red-Red-Red IF Decoupling
60	270KΩ	½		BTS-270K	Red-Vi.-Yl. Diode Load
61	270KΩ	½		BTS-270K	Red-Vi.-Yl. Tone Compensation
62	2.2 Meg.	½		BTS-2.2 Meg	Red-Red-Grn. AVC Network
63	68Ω	½			Blue-Gray-Blk. Driver Cathode
64	33KΩ	½		BTS-33K	Or.-Or.-Or. Driver Screen Dropping
65	1000Ω	½		BTS-1000	Br.-Blk.-Red Driver Plate Decoupling
66	100Ω	½			Br.-Blk.-Red Balancing Network
67	15KΩ	½		BTS-15K	Br.-Grn.-Or. De-emphasis
68	10KΩ	½		BTS-10K	Br.-Blk.-Or. Ratio Detector Diode Load
69	91Ω	½			White-Br.-Br. Balancing Network
70	820Ω	½		BTS-820	Gray-Red-Br. " "
71	1.5 Meg.	½		BTS-1.5 Meg.	Br.-Grn.-Grn. AVC Network
72	22 Meg.	½		BTS-22 Meg.	Red-Red-Blue AVC Network
73	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. Phono Shunt
74	100KΩ	½		BTS-100K	Br.-Blk.-Yl. Tone Compensation
75	27KΩ	½		BTS-27K	Red-Vi.-Or. " "
76	27KΩ	½		BTS-27K	Red-Vi.-Or. " "
77	10 Meg.	½		BTS-10 Meg.	Br.-Blk.-Blue AF Grid
78	270KΩ	½		BTS-270K	Red-Vi.-Yl. AF Plate Load
79	270KΩ	½		BTS-270K	Red-Vi.-Yl. Phase Inverter Plate Load
80	10 Meg.	½		BTS-10 Meg.	Br.-Blk.-Blue Phase Inverter Grid
81	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. Output Grid
82	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. " "
83	8200Ω	½		BTS-8200	Gray-Red-Red " "
84	560Ω	2	72865	BT-2-560	Grn.-Blue-Br. Output Cathode
85	3300Ω	2		BT-2-3300	Gr.-Or.-Red Filter
86	3300Ω	2		BT-2-3300	Or.-Or.-Red "
87	10Ω	½		BW-½-10	Br.-Blk.-Blk. Parasitic Suppressor

TRANSFORMER (POWER)

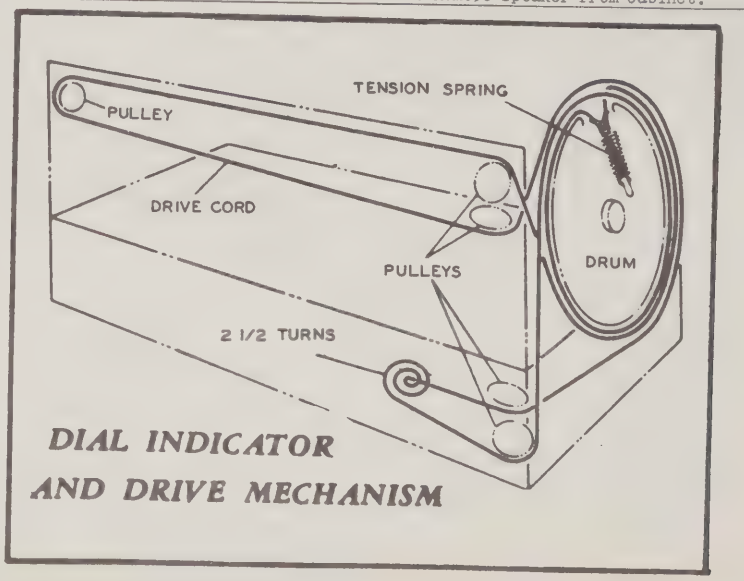
ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	RCA PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
88	117V AC	600V CT	5.0V AC	6.3V AC	71975		T22R041	
	@ .68A	@ .08A	@ 2.0A	@ 3.6A				

†Mount vertically with universal mounting brackets.



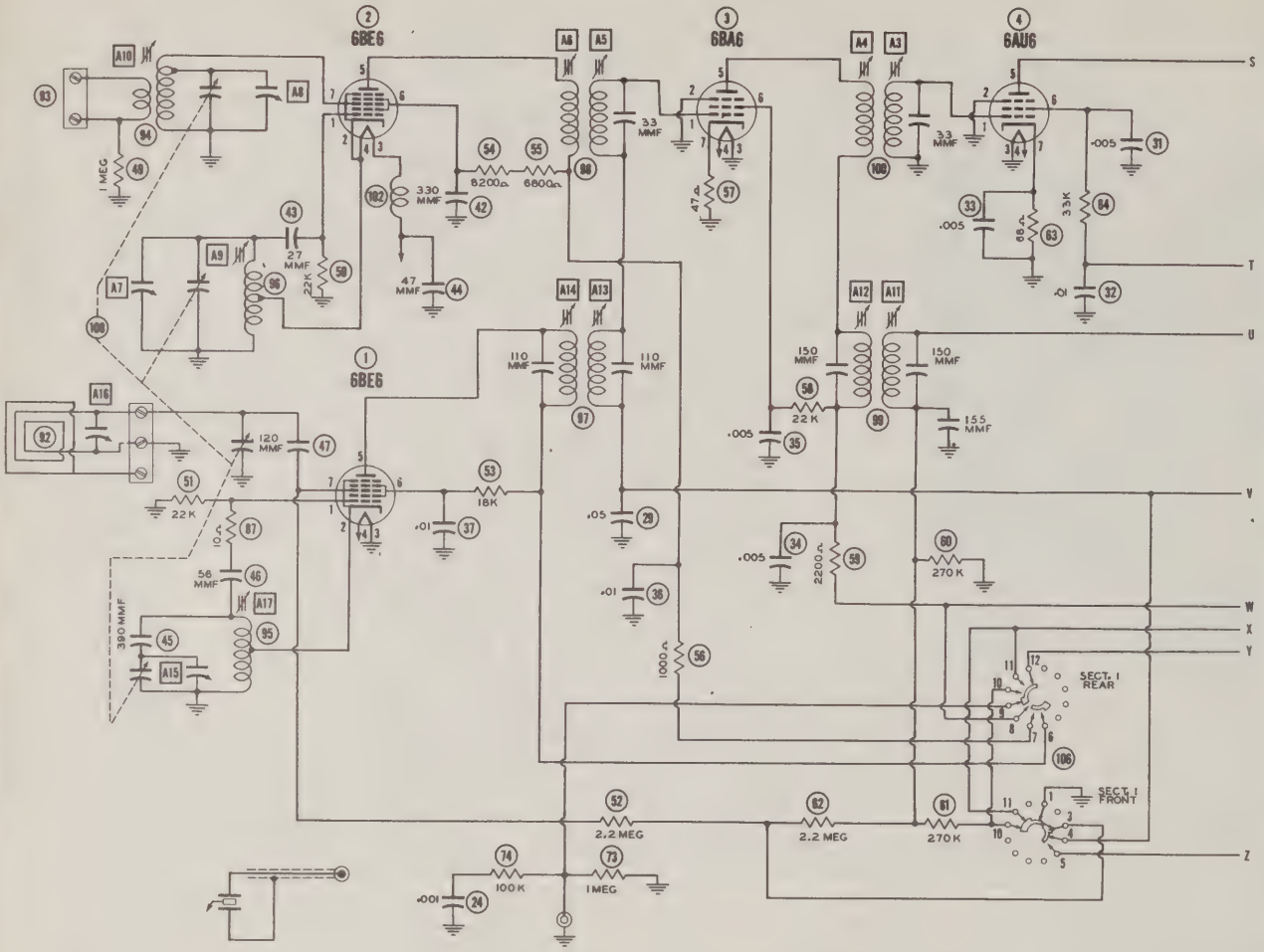
DISASSEMBLY INSTRUCTIONS

1. Remove four push-on type control knobs.
2. Remove FM dipole from terminal strip on back of cabinet.
3. Remove two wood screws holding terminal strip to cabinet.
4. Remove loop leads from loop antenna.
5. Remove phono-pickup plug from chassis.
6. Disconnect phono-motor plug.
7. Remove speaker plug from speaker.
8. Remove pilot light from bracket at bottom of cabinet.
9. Remove two hex head screws holding chassis in cabinet. Remove chassis from cabinet.
10. Remove two wood screws holding loop antenna in cabinet. Remove loop antenna from cabinet.
11. Remove three hex nuts holding speaker in cabinet. Remove speaker from cabinet.



DIAL INDICATOR AND DRIVE MECHANISM

DATE 5/48 #4810-15 SSM #10-FOLDER #15



VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6BE6	-14VDC§	0V.	0V.	6.3VAC	250VDC	100VDC	0V.	-
‡ 2	6BE6	-5VDC§	0V.	0V.	6.3VAC	235VDC	115VDC	0V.	-
3	6BA6	-.3VDC	0V.	0V.	6.3VAC	225VDC	112VDC	.8VDC	-
‡ 4	6AU6	0V.	0V.	0V.	6.3VAC	235VDC	137VDC	.8VDC	-
‡ 5	6AL5	0V.	-.5VDC	6.3VAC	0V.	-.5VDC	0V.	-.1VDC	-
6	6BQ7	0V.	-.4VDC	0V.	-.3VDC	-1.5VDC	102VDC	6.3VAC	0V.
7	6BQ7	0V.	-.6VDC	0V.	0V.	0V.	110VDC	6.3VAC	0V.
8	6K6GT	0V.	0V.	325VDC	250VDC	0V.	0V.	6.3VAC	20VDC
9	6K6GT	0V.	6.3VAC	325VDC	250VDC	0V.	0V.	0V.	20VDC
10	5Y3GT	0V.	330VDC	330VDC	300VAC	0V.	300VAC	250VDC	300VDC

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6BE6	22KΩ	1Ω	0Ω	.1Ω	300KΩ	320KΩ	4.7 Meg.	-
‡ 2	6BE6	22KΩ	0Ω	0Ω	.1Ω	300KΩ	310KΩ	0Ω	-
3	6BA6	1.5 Meg.	0Ω	0Ω	.1Ω	300KΩ	320KΩ	47Ω	-
‡ 4	6AU6	.5Ω	0Ω	0Ω	.1Ω	300KΩ	300KΩ	68Ω	-
‡ 5	6AL5	900Ω	10.8KΩ	.1Ω	0Ω	INF.	0Ω	INF.	-
6	6BQ7	0Ω	10 Meg.	0Ω	2.5 Meg.	270KΩ	570KΩ	.1Ω	0Ω
7	6BQ7	0Ω	10 Meg.	0Ω	0Ω	0Ω	570KΩ	.1Ω	0Ω
8	6K6GT	0Ω	0Ω	300KΩ	300KΩ	470KΩ	8.2KΩ	.1Ω	560Ω
9	6K6GT	0Ω	.1Ω	300KΩ	300KΩ	470KΩ	INF.	0Ω	560Ω
10	5Y3	0Ω	300KΩ	300KΩ	250Ω	INF.	240Ω	300KΩ	300KΩ

§TAKEN WITH VACUUM TUBE VOLTMETER. ‡ VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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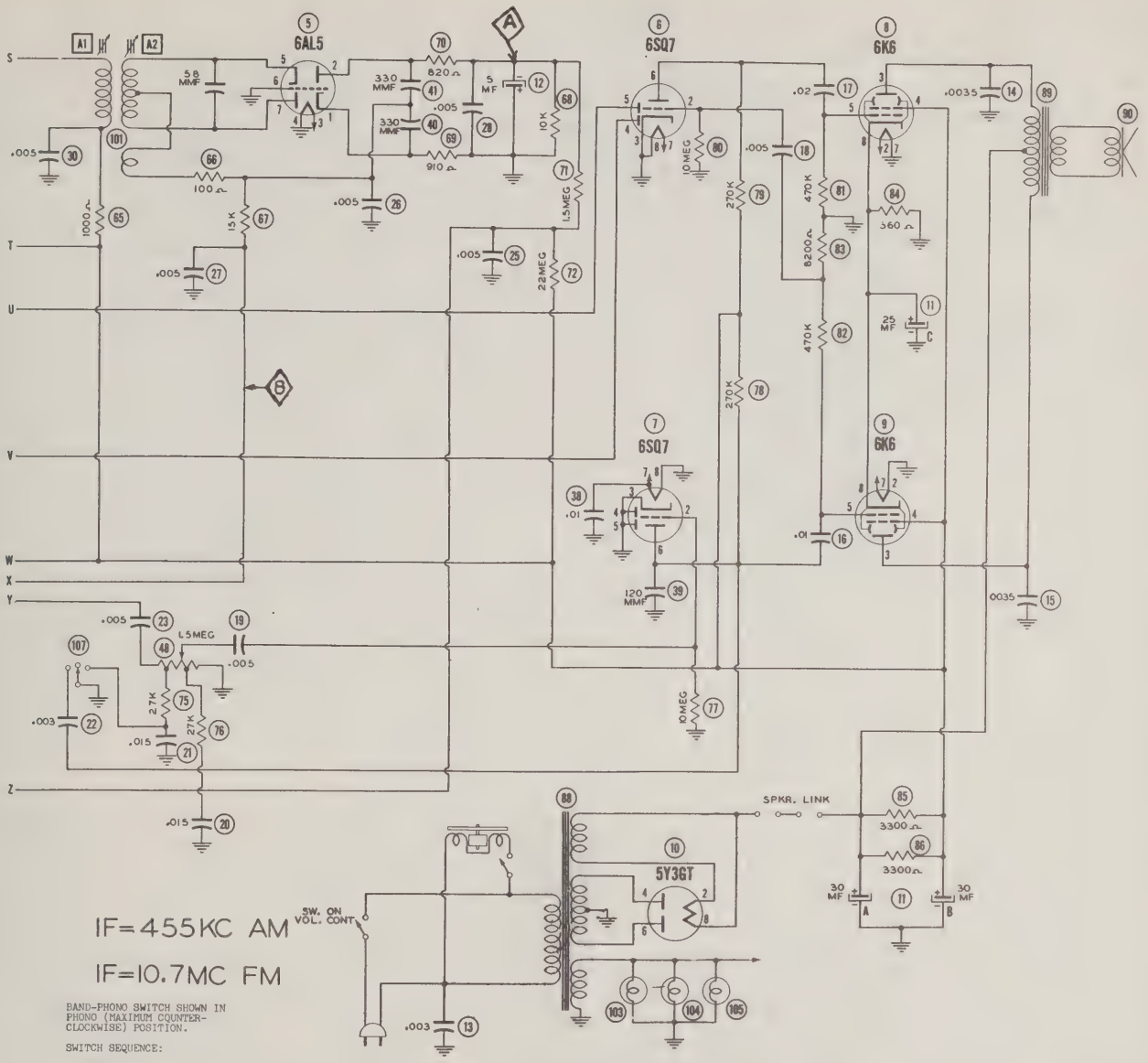
4810-15

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.



STAGE GAIN MEASUREMENTS		
ANTENNA TO CONVERTER GRID	10X	600KC
CONVERTER GAIN	70X	IN 600KC OUT 455KC
INPUT IF TRANSFORMER	1X	455KC
IF TUBE	180X	455KC
OUTPUT IF TRANSFORMER	1X	455KC
AUDIO	40X	400 ∿
OUTPUT	14X	400 ∿

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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4810-15

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer 1" from top left edge of dial backplate. This is the calibration mark referred to below.
Use insulated alignment screwdriver from all adjustments.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR VTVM & OUTPUT METER

Attenuate output of signal generator to give maximum meter deflection of 3 volts.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1	.01 MFD	High side to Pin 1 (grid) 6AU6. Low side to chassis.	10.7MC (400 ∿ Amp modulation)	FM (fully clockwise)	Tuning cap. fully closed	DC probe to Point A. Common to chassis.	A1,A2.	Connect output meter across voice coil. Adjust A1 for maximum deflection on VTVM. Adjust A2 for minimum output on output meter.
2	.01 MFD.	High side to one FM antenna terminal. Low side to other terminal.	"	"	"	"	A3,A4	Shunt 680Ω resistor between terminals C & D on 2nd FM IF Transformer (100) and adjust A3 for maximum deflection. Transfer shunt to terminals A & F and adjust A4 for maximum deflection. Remove shunt.
3	.01 MFD.	"	"	"	"	"	A5,A6.	Shunt 680Ω resistor between terminals C & D on FM 1st IF Transformer (98) and adjust A5 for maximum deflection. Transfer shunt to terminals A & F and adjust A6 for maximum deflection. Remove shunt and continue with FM-RF Alignment, Step 4.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use freq. modulated signal with 60 ∿ modulation and 450KC sweep. Use 120 ∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	SCOPE CONNECT	ADJUST	REMARKS
1	.01 MFD	High side to Pin 1 (grid) 6BA6. Low side to chassis.	10.7MC (freq. mod.)	FM	Tuning cap. fully open.	Vertical input to Point A. Ground to chassis.	A1,A3, A4.	Disconnect 5 MFD cap. from Point A . Adjust for maximum amplitude, symmetry and coincidence of pattern per Fig. 1.
2	.01 MFD	High side to Pin 7 (grid) of 6BE6 FM Conv. Tube (2). Low side to chassis.	"	"	"	"	A5,A6	Adjust for maximum amplitude, symmetry & coincidence of pattern per Fig. 1. Reconnect 5MFD cap. to Point A .
3	.01 MFD	"	"	"	"	Vertical input to Point B. Ground to chassis.	A2	Adjust for maximum straightness of crossover lines with crossover occuring at center of pattern per Fig. 2. Continue with FM-RF Alignment, Step 4.

FIG. 1

FIG. 2

FM RF ALIGNMENT

Attenuate output of signal generator to give maximum meter deflection of 3 volts.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4	2 - 120Ω carbon res.	Each side in series with 120Ω to FM antenna terminals.	106MC (unmodulated)	FM	5-3/4" from calibration mark.	DC probe to Point A. Common to chassis	A7	Adjust for maximum deflection.
5	"	"	"	"	Tune for maximum deflection.	"	A8	Rock tuning cap. and adjust for maximum deflection.
6	"	"	90MC	"	1-1/4" from calibration mark.	"	A9	Adjust for maximum deflection.
7	"	"	"	"	Tune for maximum deflection.	"	A10	Rock tuning cap. and adjust for maximum deflection. Repeat Steps 4, 5, 6 and 7 until no further improvement can be made.

AM ALIGNMENT

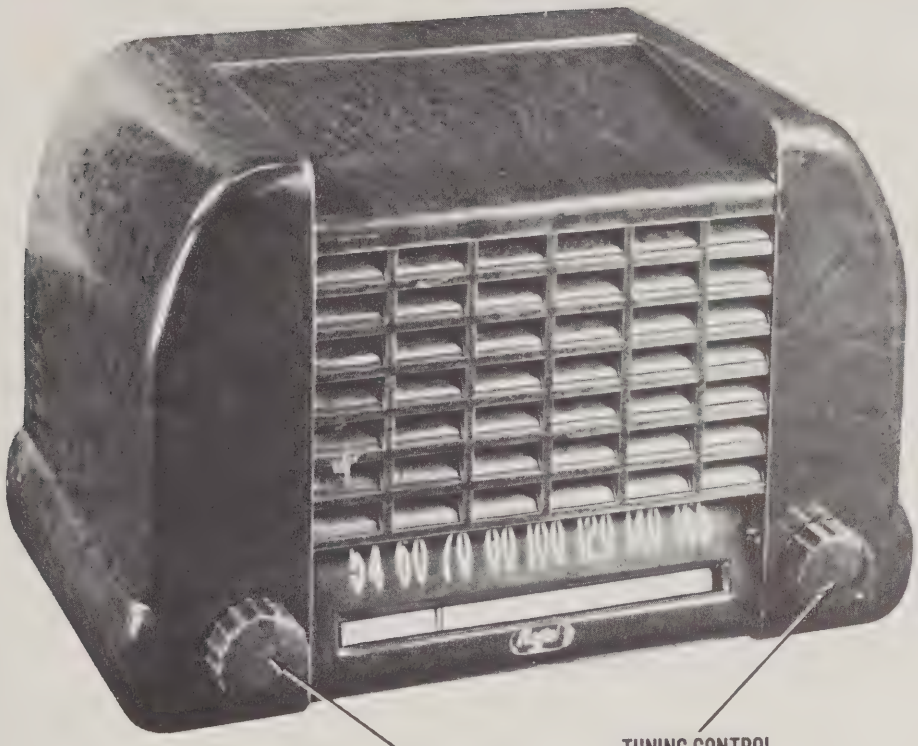
FM IF Alignment must be done before AM IF Alignment.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Adjust for maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
8	.01 MFD	High side to Pin 7 (grid) 6BE6 AM Converter Tube (1). Low side to chassis.	455KC	BC (Center position)	Tuning cap. fully closed	Across voice coil.	A11, A12	Shunt 47KΩ resistor between terminals C & D on AM output IF transformer (99), and adjust A11 for maximum output. Transfer shunt to terminals A & F and adjust A12 for maximum output. Remove shunt.
9	.01 MFD.	"	"	"	"	"	A13,A14	Shunt 47KΩ resistor between terminals C & D on AM Input IF Transformer (97) and adjust A13 for maximum output. Transfer shunt to terminals A & F and adjust A14 for maximum output. Remove shunt.
10	200MMFD	High side to antenna terminal "A" with link open. Low side to chassis.	1400KC	BC	6" from calibration mark	Across voice coil	A15	Adjust for maximum output.
11	200MMFD	"	"	"	Tune for maximum output.	"	A16	" " " "
12	200MMFD	"	600KC	"	"	"	A17	Rock tuning cap. and adjust for maximum output. Repeat Steps 10, 11 & 12 until no further improvement can be made.

With receiver reinstalled in cabinet tune in weak station near 1400KC and adjust A16 for maximum volume.

CRITICAL LEAD DRESS

1. Dress capacitor (43) near chassis base.
2. Dress lead from Pin 5 of 6BE6 (2) to terminal C of transformer (98), as near bottom of FM shelf as possible.
3. The lead from capacitor (23) to the high side of the volume control must be dressed next to chassis along front apron.
4. Dress resistors (77) and (80) near chassis base.
5. Dress all AC leads away from volume control.
6. Solder FM antenna coil primary leads to terminal board with as short a lead length as is practical.
7. Make all FM leads as short as possible.
8. The lead from Pin 2 of 6BA6 to chassis ground must be dressed as close to base and as near to the back apron as possible. This lead provides degeneration for the IF stage and neither its length nor the point at which it is grounded to the chassis should be changed.
9. Dress all leads away from (85) & (86).



REGAL MODEL
7251

REGAL MODEL
7251

REGAL MODEL 7251

TRADE NAME	Regal, Model 7251
MANUFACTURER	Regal Electronics Corp., 605 W. 130th St., New York, N.Y.
TYPE SET	AC-DC Operated Superheterodyne Receiver with Loop Antenna
TUBES (FIVE)	Types, 12SA7 Converter, 12SG7 IF Amp., 12SQ7GT Det.-AVC-AF, 50L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	105-125 Volts AC-DC
TUNING RANGE—BROADCAST	540-1650KC RATING .25 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.
Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to Pin 8 (grid) of 12SA7. Low side to B-.	456KC	Tuning cap. fully open.	Across voice coil	A1,A2	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD. to reduce hum modulation.
2	.1 MFD.	High side to external antenna lead. Low side to B-.	1650KC	"	"	A3	Adjust for maximum output. Trimmer opposite A3 is a factory adjustment and ordinarily need not be changed.
3	.1 MFD.	"	"	Tune for maximum output.	"	A4	Adjust for maximum output.

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DATE 5/48-#4810-16 SET #40-FOLDER #16

PARTS LIST AND DESCRIPTIONS

REGAL MODEL 7251

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: REGAL PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	12SA7	12SA7	8R	
2	IF Amp.	12SG7	12SG7	8BK	
3	Det.-AVC-AF	12SQ7GT	12SQ7GT	8Q	
4	Power Output	50L6GT	50L6GT	7AC	
5	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: REGAL PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
6A	50	150	60-101	PRSA150/50-50	EZ5515	DSB-2x50-150	TA-505	Filter-Red
B	50	150						" -Grn.
7	.05	400	50-103	484-05	DT4S5	ST-4-05	TC-15	Line Filter
8	.01	600	50-102	684-01	DT6S1	ST-6-01	TC-11	Output Plate Bypass
9	.01	600	50-102	684-01	DT6S1	ST-6-01	TC-11	Audio Coupling
10	.005	400	50-101	484-005	DT6D5	ST-6-005	TC-25	" "
11	.05	200	50-104	484-05	DT2S5	ST-4-05	TC-15	AVC Filter
12	.01	600	50-102	684-01	DT6S1	ST-6-01	TC-11	Conv. Cathode Bypass
13	.05	200	50-104	484-05	DT2S5	ST-4-05	TC-15	RF Bypass Pwr. Supply
14	.2	400	50-120	484-.2	DT4P2	ST-4-2	72P3	Line Isolation
15	150	500		1468-00015	5W5T15	MO.5-315	1FM-315	AF Plate Bypass
16	250	500	55-103	1468-00025	5W5T25	MO.5-325	1FM-325	Diode RF Filter
17	500	500	55-104	1468-0005	5W5T5	MO.5-35	1FM-35	IF Coupling
18	100	500	55-102	1468-0001	5W5T1	MO.5-31	1FM-31	Osc. Grid Cap.

CONTROLS

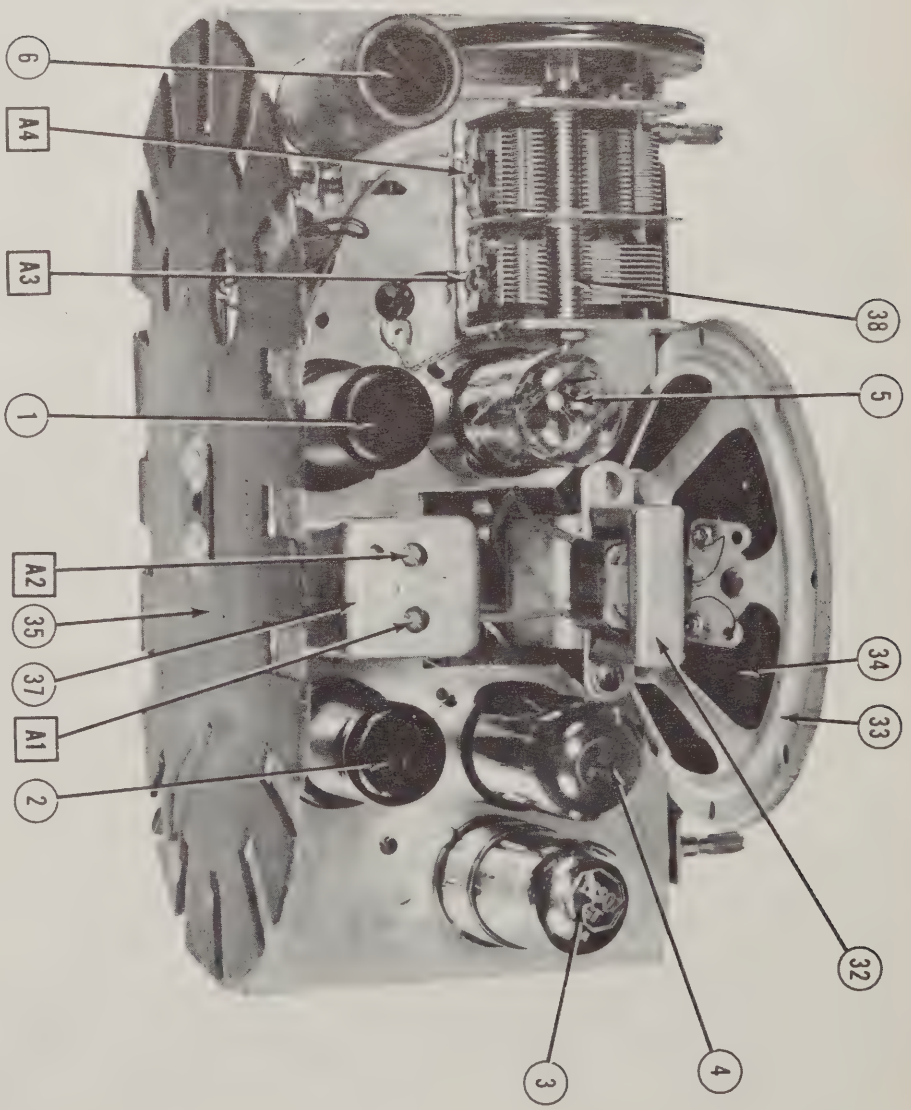
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: REGAL PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
19A	500KΩ	½	20-103	D13-133	AM-60-Z	Volume Control
B	Shaft		Not Req.	E	KSS-3	Attach to 19A per instructions
C	Switch		" "	41	SW-A	" " " " "

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: REGAL PART No.	IRC PART No.	IDENTIFICATION CODES
20	15KΩ	½	65-155	BTS-15K	Br.-Grn.-Or. Oscillator Grid
21	120Ω	½	65-149	BW-½-120	Br.-Red-Br. Converter Cathode
22	250KΩ	½	65-108	BTS-220K	Red-Grn.-Yl. Output Grid
23	6800Ω	½	65-151	BTS-6800	Blue-Gray-Red IF Plate Load
24	100KΩ	½	65-125	BTS-100K	Br.-Blk.-Yl. Diode Filter
25	2.2 Meg.	½	65-110	BTS-2.2 Meg.	Red-Red-Grn. AVC Network
26	8.2 Meg.	½		BTS-8.2 Meg.	Gray-Red-Grn. AF Grid-See Note 1
27	250KΩ	½	65-108	BTS-220K	Red-Grn.-Yl. AF Plate Load
28	2400Ω	2	65-175	BT-2-2200	Red-Yl.-Red Filter
29	22Ω	½		BW-½-22	Red-Red-Blk. Rectifier Ballast-See Note 2
30	250KΩ	½	65-108	BTS-220K	Red-Grn.-Yl. Line Isolation
31	470Ω	½	65-172	BTS-470	Yl.-Vi.-Br. Parasitic Suppressor

Note 1-Some models use 10 Meg. in this application. IRC replacement BTS-10 Meg.
Note 2-Some models use 33Ω in this application. IRC replacement BW-½-33.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		REGAL PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
32	2000Ω	3.3Ω	150Ω	.5Ω	38A23	A-3876#	T22S45#	A-2928#	#Drill one new mounting hole.

SPEAKER

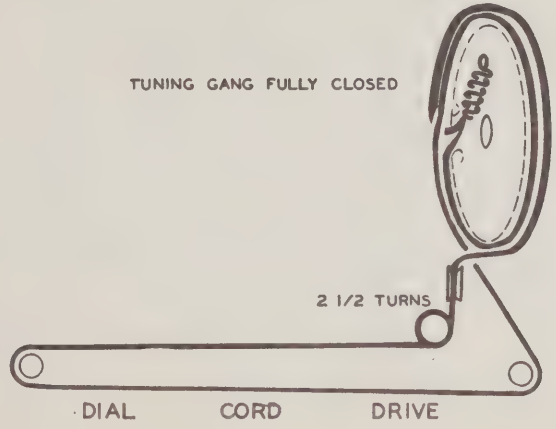
ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			REGAL PART No.	JENSEN PART No.	QUAM PART No.	
33	FIELD PM	VC IMP. 3.3Ω	110-106	ST-105 Mod. P5-X	5A07	
34	CONE DIA. 4-3/4"	VC DIA. 1/2"				

R F COILS

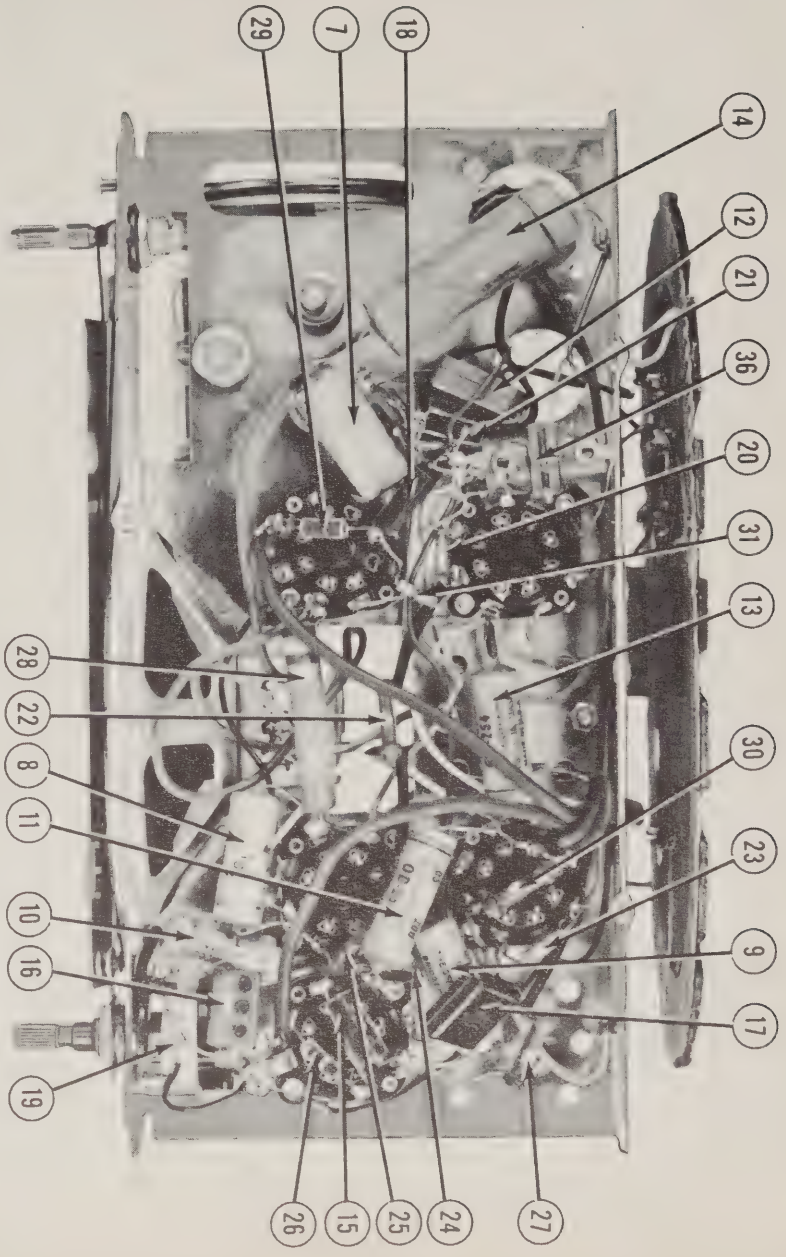
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	REGAL PART No.	MEISSNER PART No.	
35	Ant. Loop		2.3Ω	30-149		
36	BC Osc. Coil		5.2Ω	30-127	14-1060	
37	IF Trans.	21.5Ω	21.5Ω	30-129	16-6660	

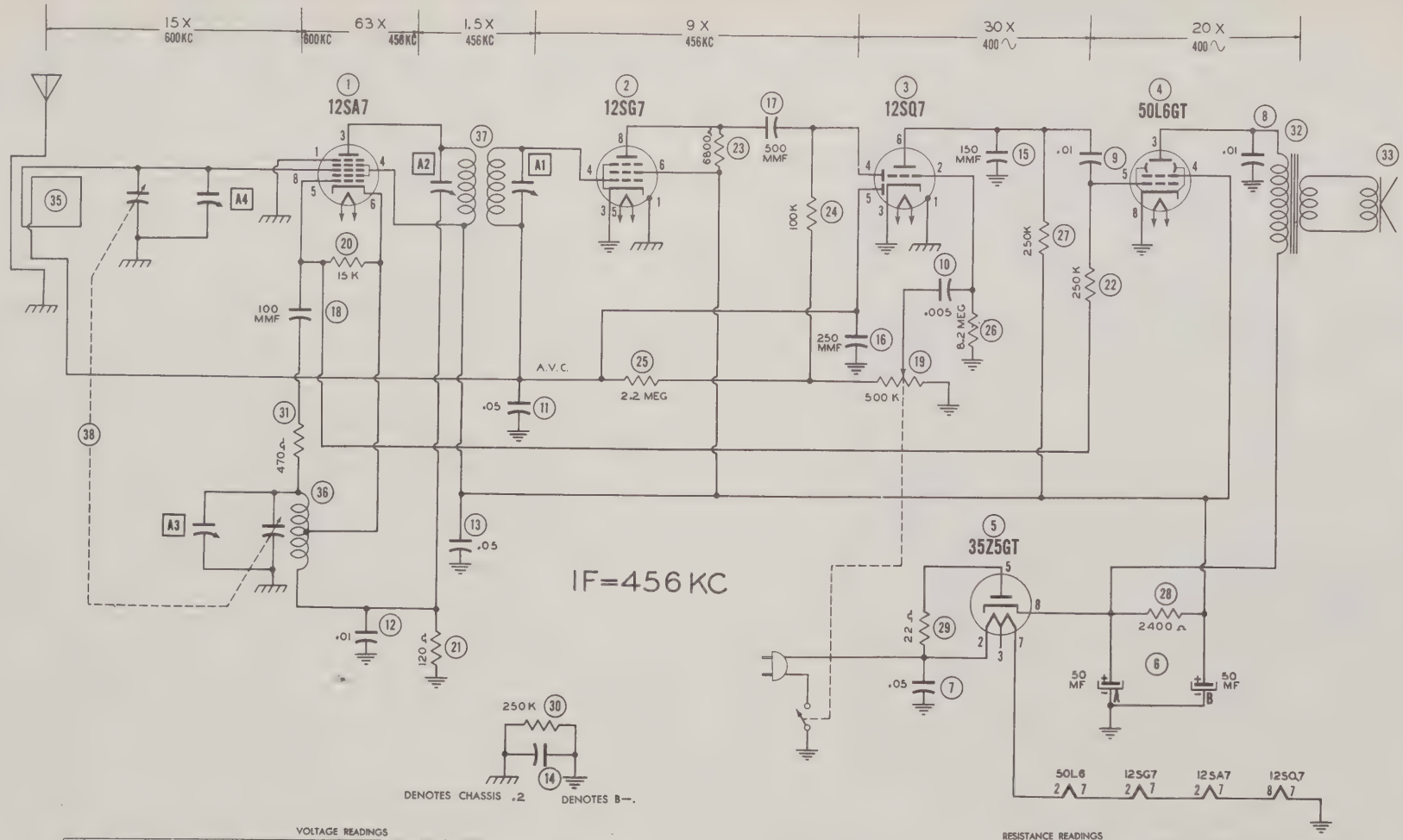
MISCELLANEOUS

ITEM No.	PART NAME	REGAL PART No.	NOTES
38	2 Gang Var. Cap.	40-101	(22-470MMF, 28-210MMF)



CHASSIS—BOTTOM VIEW





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7	0V.	23VAC	87VDC	87VDC	-6.5VDC§	1VDC	12VAC	-.6VDC
2	12SG7	0V.	36VAC	0V.	-.6VDC	0V.	87VDC	23VAC	87VDC
3	12SQ7GT	0V.	-.4VDC	0V.	-.6VDC	-.6VDC	60VDC	0V.	12VAC
4	50L6GT	0V.	85VAC	125VDC	87VDC	-6.5VDC§	-.4VDC	36VAC	0V.
5	35Z5GT	0V.	117VAC	110VAC	0V.	116VAC	-6.5VAC§	85VAC	132VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7	250KΩ	21Ω	200KΩ	200KΩ	15KΩ	120Ω	12Ω	2.7 Meg.
2	12SG7	250KΩ	36Ω	0Ω	2.7 Meg.	0Ω	200KΩ	21Ω	200KΩ
3	12SQ7GT	250KΩ	8 Meg.	0Ω	2.7 Meg.	600KΩ	420KΩ	0Ω	12Ω
4	50L6GT	0Ω	89Ω	200KΩ	200KΩ	250KΩ	500KΩ	36Ω	0Ω
5	35Z5GT	INF.	120Ω	115Ω	INF.	140Ω	15KΩ	89Ω	200KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS.

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

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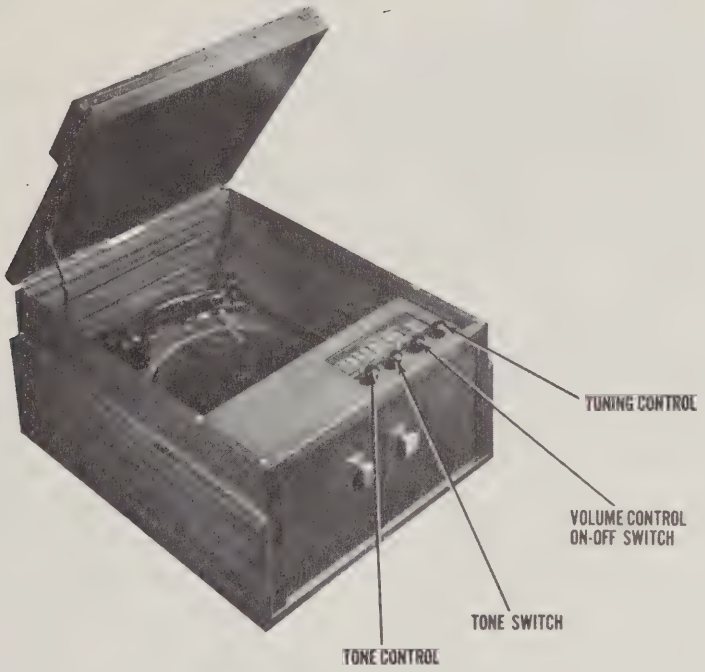
4810-16

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.



REMLER MODEL 5310

TRADE NAME	Remler, Model 5310
MANUFACTURER	Remler Co., Ltd., 2101 Bryand St., San Francisco, Calif.
TYPE SET	AC Operated Combination Phono-Radio Superheterodyne Receiver with Loop Antenna
TUBES (SIX)	Types, 12BA6 RF Amp., 12BE6 Converter, 12BA6 IF Amp., 12AT6 Det.-AVC-AF, (2) 35B5 Power Output.
POWER SUPPLY	110-120 Volts AC
TUNING RANGE—BROADCAST	540-1600KC RATING .45 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to left edge of first dial calibration number.

Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to rear stator of tuning cap, Low side to B-.	450KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD to reduce hum modulation.
2		Loop	1600KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output. The trimmer opposite A5 is a factory adjustment and ordinarily need not be adjusted.
3	.1 MFD.	"	1400KC	Tune for maximum output.	"	A6	Adjust for maximum output.

DISASSEMBLY INSTRUCTIONS

1. Loosen set screws and remove four control knobs.
2. Remove four screws holding control panel in cabinet. Remove panel from cabinet.
3. Remove four screws holding loop antenna in cabinet. Remove plug from loop antenna. Remove loop from cabinet.
4. Remove phono-motor plug from chassis.
5. Remove phono-pickup plug from chassis.
6. Disconnect phono frame isolation lead.
7. Remove two screws holding speaker and chassis mounting board in cabinet. Lift mounting board out top of cabinet.

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PARTS LIST AND DESCRIPTIONS

REMLER MODEL 531

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: REMLER PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	12BA6	12BA6	7SK	
2	Converter	12BE6	12BE6	7CK	
3	IF Amp.	12BA6	12BA6	7SK	
4	Det.-AVC-AF	12AT6	12AT6	7BT	
5	Power Output	35L6	35L6	7BZ	
6	" "	35Z5	35Z5	7SZ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: REMLER PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
7	60	150	L-10151	PRS150/50	BR2015	M-20-150	UT-201	Filter
8A	50	150	L-10147	PRSA150/50-50	EZ5515	DSB-2x50-150	TA-505	" -Red
B	40	150						" -Yl.
9	20	150		PRS150/20	BR2015	M-20-150	UT-201	Bias Filter
10	.05	600		684-05	DT6S5	ST-6-05	TC-15	Line Filter
11	.2	200		484-.2	DT2P2	ST-4-2	TC-2	Line Isolation
12	.2	200		484-.2	DT2P2	ST-4-2	TC-2	RF Bypass Pwr. Supply
13	.05	200		484-05	DT2S5	ST-4-05	TC-15	Phono Isolation
14	.004	600		684-004	DT6D4	ST-6-004	TC-24	Output Plate Bypass
15	.01	600		684-01	DT6S1	ST-6-01	TC-11	Audio Coupling
16	.01	600		684-01	DT6S1	ST-6-01	TC-11	" "
17	.004	600		684-004	DT6D4	ST-6-004	TC-24	Tone Compensation
18	.05	200		484-05	DT2S5	ST-4-05	TC-15	AVC Filter
19	.05	200		484-05	DT2S5	ST-4-05	TC-15	RF Cathode Bypass
20	.05	600		684-05	DT6S5	ST-6-05	TC-15	Phono Motor Bypass
21	470	500		1468-0005	5W5T5	MO.5-35	1FM-35	AF Plate Bypass
22	70	500		1468-000075	5W5Q7	MOS.5-47	1FM-475	Phono Tone Comp.
23	500	500		1468-0005	5W5T5	MO.5-35	1FM-35	Diode RF Filter
24	470	500		1468-0005	5W5T5	MO.5-35	1FM-35	RF Bypass
25	68	500		1468-000075	5W5Q7	MOS.5-47	1FM-475	Osc. Grid Cap.
26	470	500		1468-0005	5W5T5	MO.5-35	1FM-35	RF Coupling
27	470	500		1468-0005	5W5T5	MO.5-35	1FM-35	" "
28	10	500		1468-00001	5W5Q1	MO.5-41	MS-41	Ext. Ant. Coupling

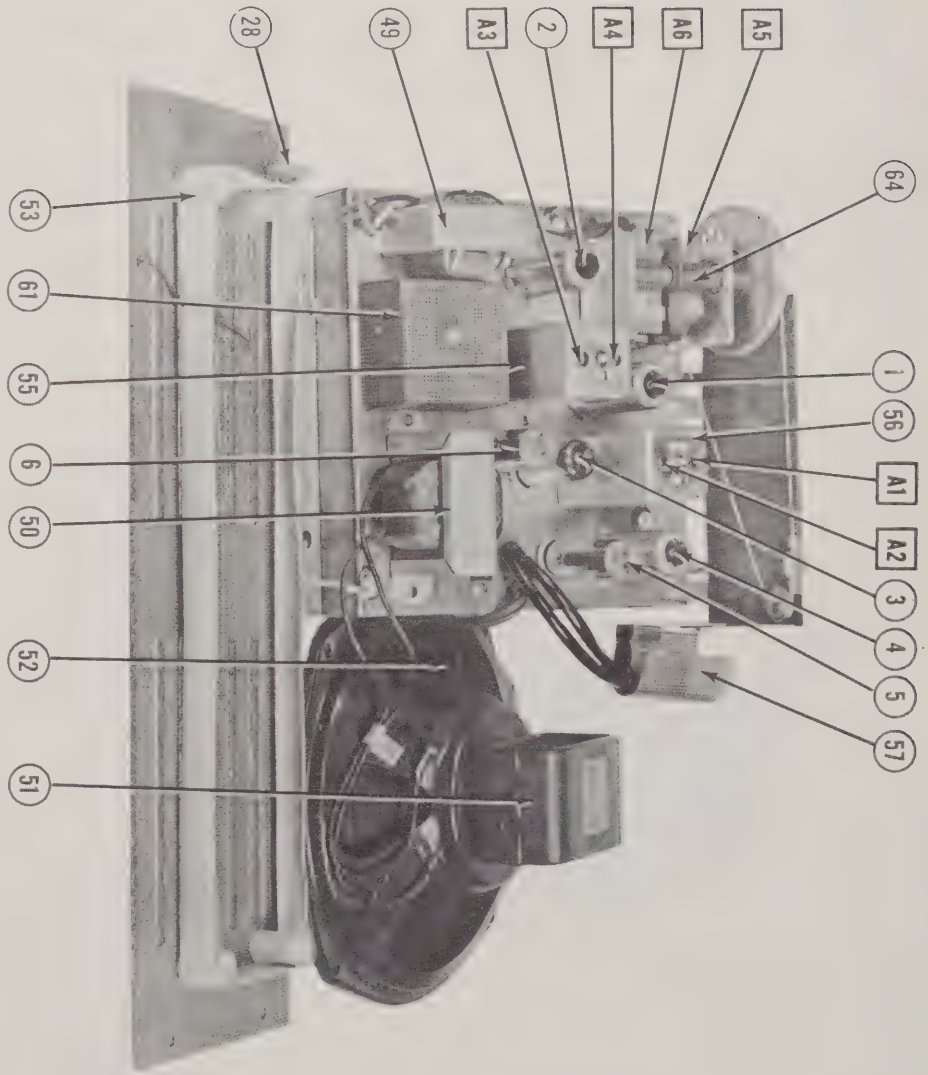
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: REMLER PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
29A	3 Meg.	½		D13-140	M-67-Z	Volume Control
B	Shaft			A	Not Req.	Attach to 29A per instructions
C	Switch			41	SW-A	" " " " "
30A	1 Meg.	½		D13-137	M-63-Z	Tone Control
B	Shaft			A	Not Req.	Attach to 30A per instructions

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: REMLER PART No.	IRC PART No.	IDENTIFICATION CODES
31	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. RF Grid
32	47Ω	½		BTS-47Ω	Yl.-Vi.-Br. RF Cathode
33	220Ω	½		BTS-220Ω	Red-Red-Red RF Plate Load
34	100K	½		BTS-100K	Br.-Blk.-Yl. Converter Grid
35	22K	½		BTS-22K	Red-Red-Or. Oscillator Grid
36	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. AVC Network
37	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. " "
38	330Ω	1		BW-1-330	Or.-Or.-Br. IF Cathode
39	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Blue AF Grid
40	220K	½		BTS-220K	Red-Blk.-Yl. AF Plate Load
41	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. Volume Control Shunt
42	100K	½		BTS-100K	Br.-Blk.-Yl. Output Grid
43	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. Series Phase
44	470K	½		BTS-470K	Yl.-Vi.-Yl. Line Isolation
45	33K	½		BTS-33K	Or.-Or.-Or. Bias Bleeder
46	100K	½		BTS-100K	Br.-Blk.-Yl. Bias Filter
47	100Ω	½		WW-2-100	Br.-Red-Br. Filter
48	1Ω	1			Surge Limiter

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

FILTER CHOKE

ITEM NO.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ~)	REMLER PART NO.	STANCOR PART NO.	THORDARSON PART NO.	MERIT PART No.	
45	.11 A	1[illegible]Ω	.7 Henries	L-[illegible]72				

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		REMLER PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
53	15[illegible]Ω	2.5Ω	1[illegible]Ω	1.1Ω	L-[illegible]266		T-[illegible]3396	A-[illegible]*	*Drill new mtg. holes.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			REMLER PART No.	JENSEN PART No.	QUAM PART No.	
51	FIELD	VC IMP.	L-1[illegible]084	ST-12[illegible] Nos. P8-8H	8A4	
	PM	2.5Ω				
52	CONE DIA.	VC DIA.				
	7-3/8"	1"				

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	REMLER PART No.	MEISSNER PART No.	
53	Loop Ant.		1.3Ω	W-[illegible]276		
54	Osc. Coil	.7Ω	5Ω	L-30230	14-1060	
55	Input IF	19Ω	19Ω	C-30259	16-6658	
56	Output IF	19Ω	19Ω	L-30260	16-[illegible]6	

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					REMLER PART No.		
57	S [illegible]	12V			L-[illegible]-1		Type C-7

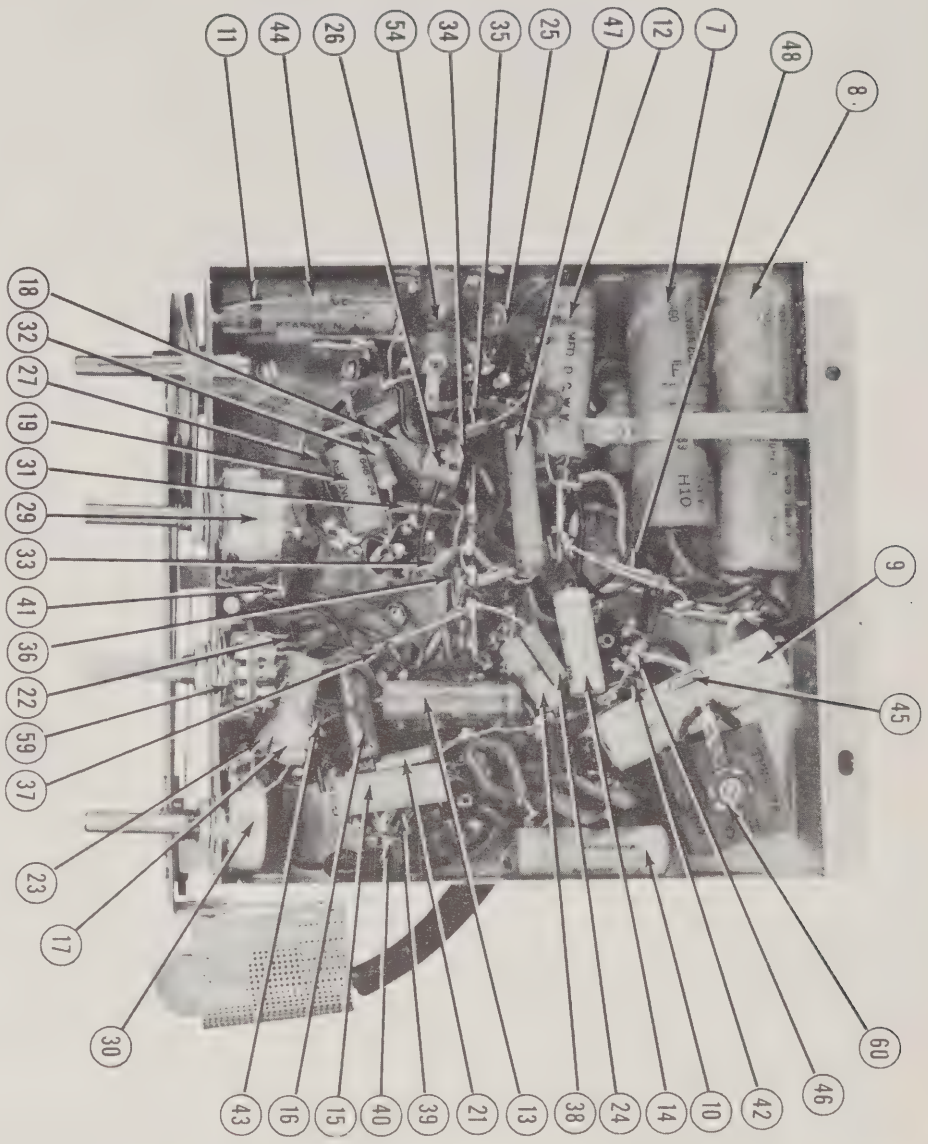
PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA		REMARKS
	REMLER PART No.	ASTATIC PART No.	
58	L-30276	4[illegible]3-..	4T-H Original Part.

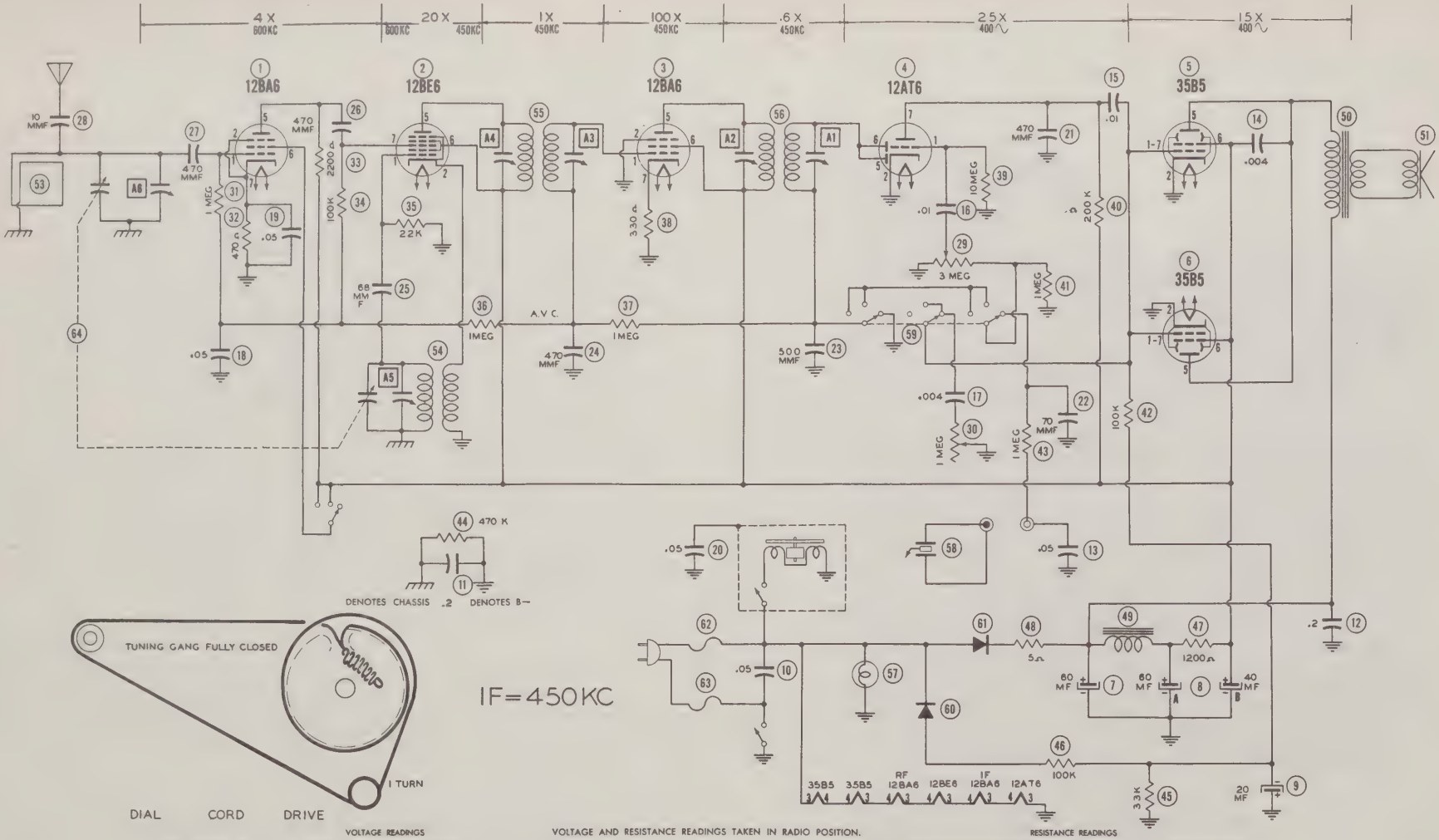
MISCELLANEOUS

ITEM No.	PART NAME	REMLER PART No.	NOTES
[illegible]	[illegible]	L-[illegible]	Phono-Radio-Tone
[illegible]	[illegible]ler	L-[illegible]	Selenium (Bias)
[illegible]	"	L-[illegible]	"
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	"	[illegible]	[illegible]
[illegible]	2 Gang Var. C.	[illegible]	([illegible]MF, [illegible]MFD)
	Dial	W-[illegible]	
	Dial Pointer	[illegible]-[illegible]	

CHASSIS—BOTTOM VIEW



REMLER MODEL 5510



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	12BA6	0V.	3.2VDC	39VAC	50VAC	92VDC	105VDC	3.2VDC
2	12BE6	-16VDC§	0V.	26VAC	39VAC	105VDC	105VDC	0V.
3	12BA6	0V.	0V.	13VAC	26 VAC	105VDC	105VDC	2.6VDC
4	12AT6	-.5VDC	0V.	0V.	13VAC	-.7VDC	-.7VDC	56VDC
5	35B5	-7.5VDC	0V.	80VAC	83VAC	130VDC	105VDC	-7.5VDC
6	35B5	-7.5VDC	0V.	117VAC	83VAC	130VDC	105VDC	-7.5VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

VOLTAGE AND RESISTANCE READINGS TAKEN IN RADIO POSITION.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	12BA6	3.7 Meg.	470Ω	34Ω	43Ω	33KΩ	31KΩ	470Ω
2	12BE6	22KΩ	.7Ω	24Ω	34Ω	31KΩ	31KΩ	2.8 Meg.
3	12BA6	1.7 Meg.	0Ω	13Ω	24Ω	31KΩ	31KΩ	330Ω
4	12AT6	10 Meg.	0Ω	0Ω	13Ω	750KΩ	750KΩ	250KΩ
5	35B5	130KΩ	0Ω	43Ω	67Ω	30KΩ	31KΩ	130KΩ
6	35B5	130KΩ	0Ω	80Ω	67Ω	30KΩ	31KΩ	130KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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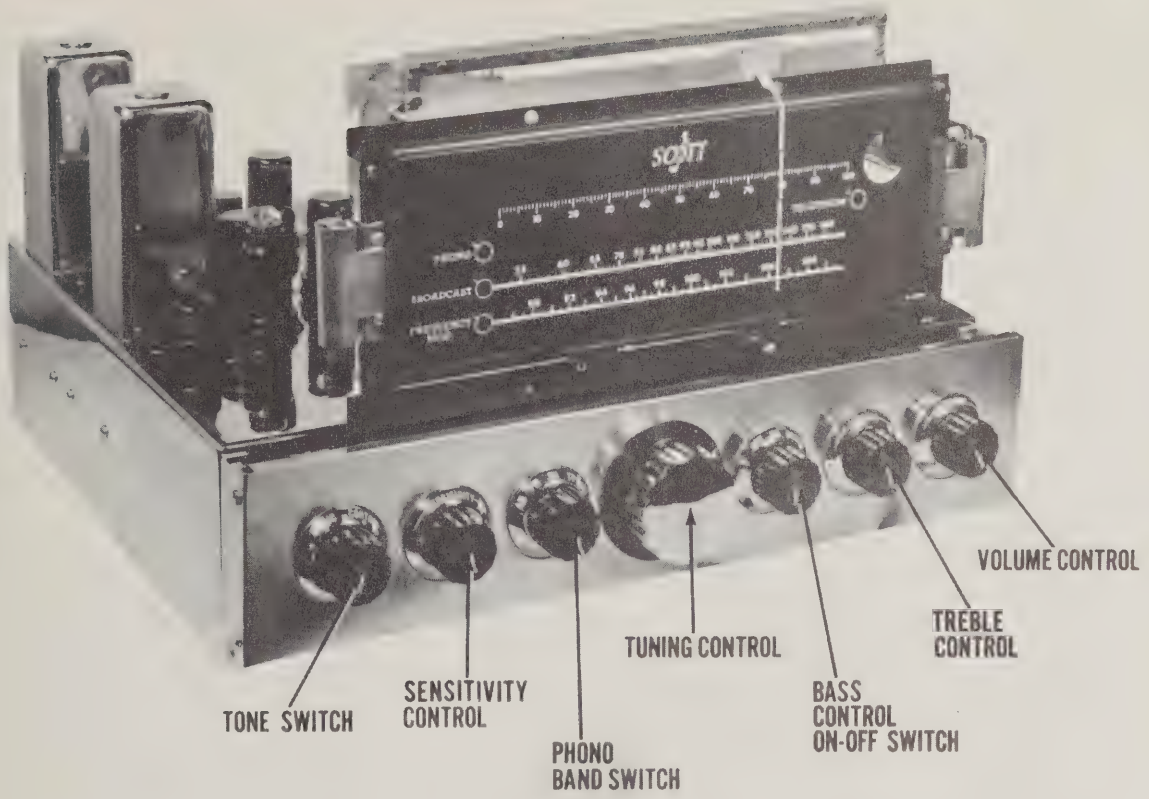
4810-17

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

SCOTT
MODEL 16A



SCOTT
MODEL 16A

SCOTT MODEL 16A

TRADE NAME	Scott, Model 16A
MANUFACTURER	Scott Radio Labs, Inc., 4450 Ravenswood Ave., Chicago, Ill.
TYPE SET	AC Operated AM-FM Superheterodyne Receiver
TUBES (TWENTY-EIGHT)	Types, 6AU6 FM RF Amp., 6AG5 FM Mixer, 6C4 FM Osc., 6SK7 AM RF Amp., 6SA7 AM Converter, (2) 6SG7 FM IF Amp., (2) 6SH7 FM Limiter, 6H6 FM Disc., 6SG7 AM IF Amp., 6H6 AM Det.-AVC, 6E5 Tuning Eye, 6SJ7 Mic. Amp., 6B8 Music Cont. Amp., (2) 6SG7 Treble Gate, 6SJ7 Bass Gate, 6SJ7 1st AF Amp., 6SL7GT 2nd AF Amp., 6J5 Audio Coupling, 6J5 3rd AF Amp., 6SN7GT Phase Inv., (2) 6L6G Power Output, VR-150 Voltage Reg., (2) 5U4G Rectifier.
POWER SUPPLY	110-120 Volts AC
RATING	2 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1600KC FREQ. MOD. 88-108MC

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

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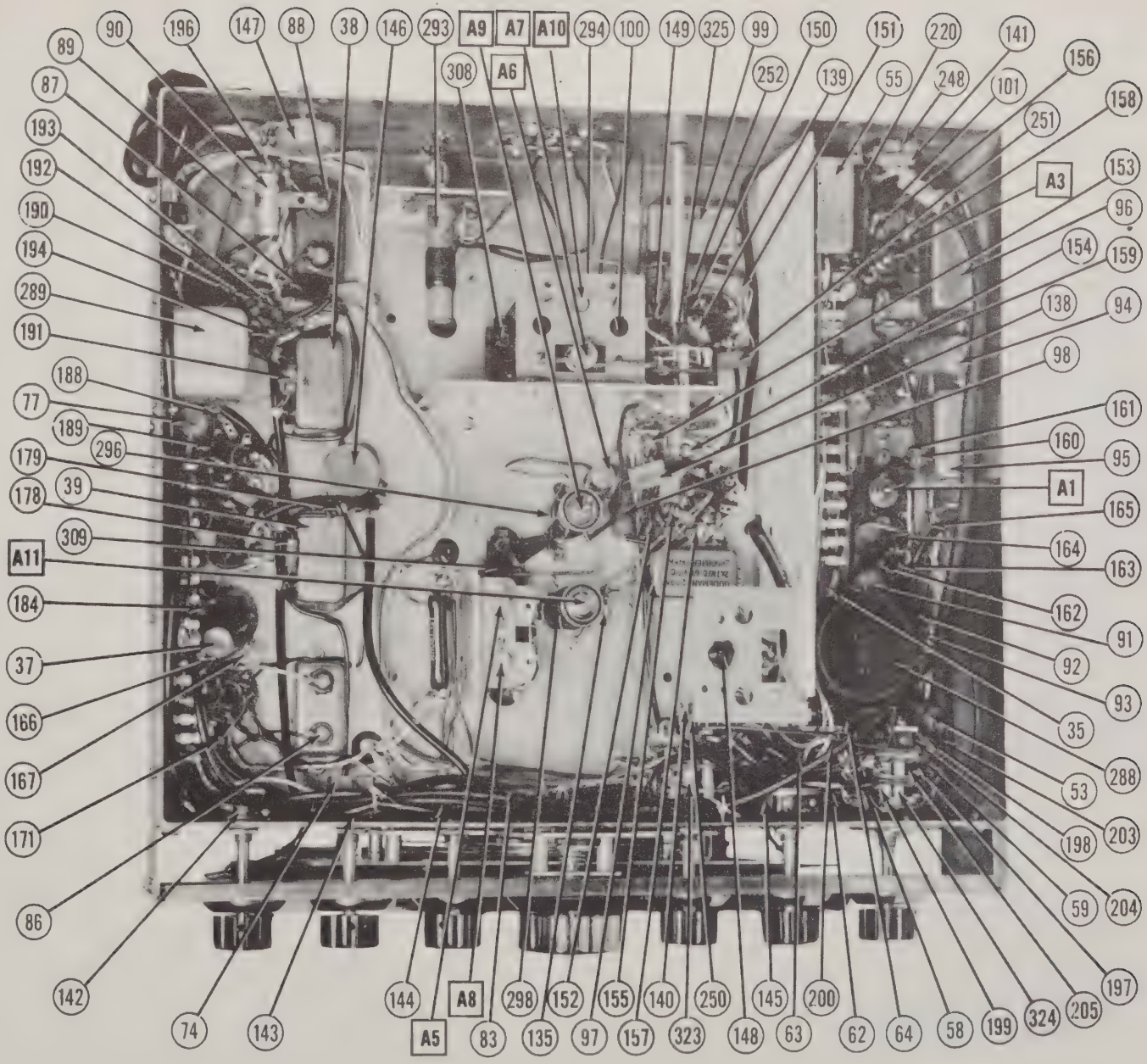
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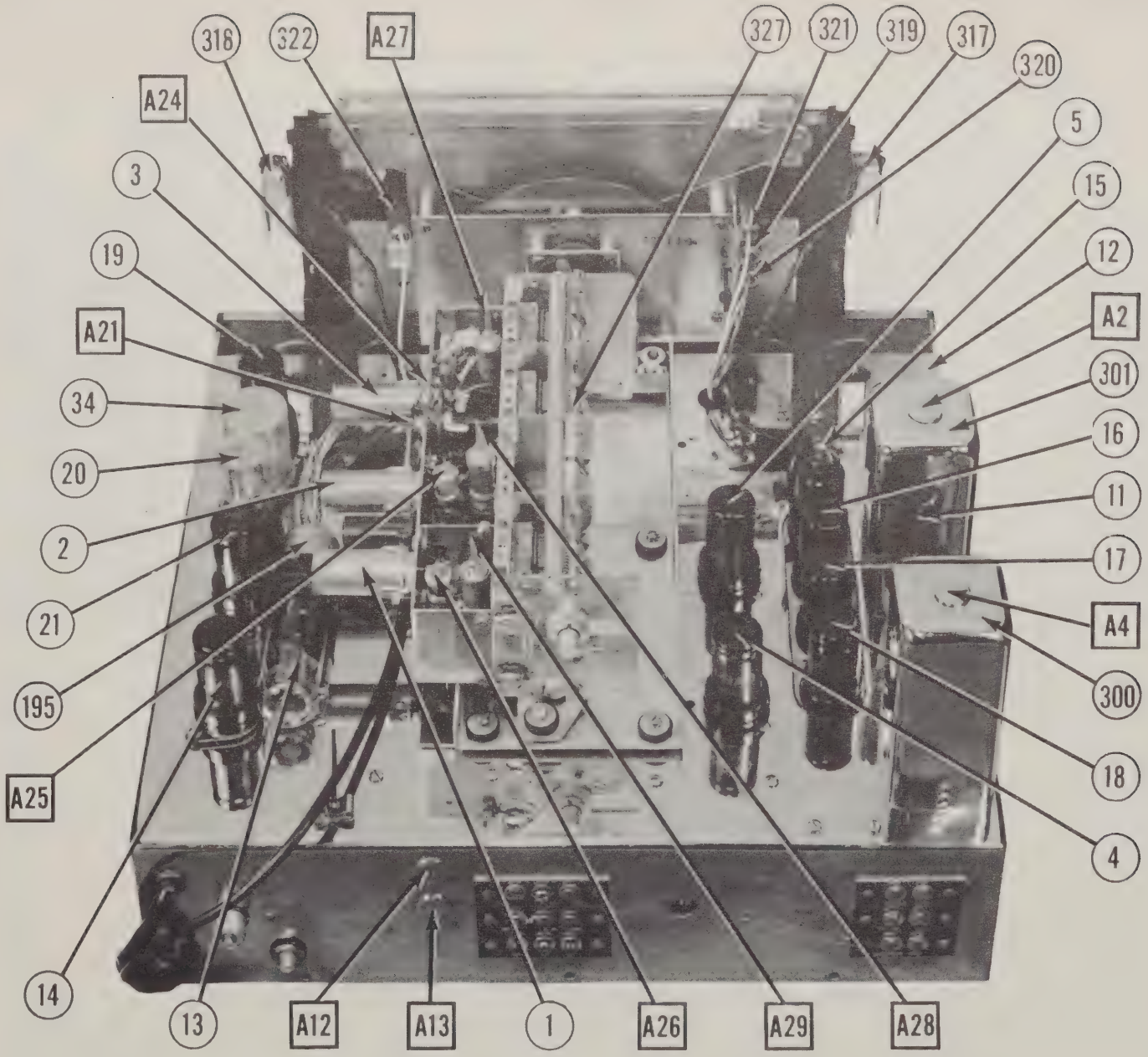
SCOTT
MODEL 16A PAGE 3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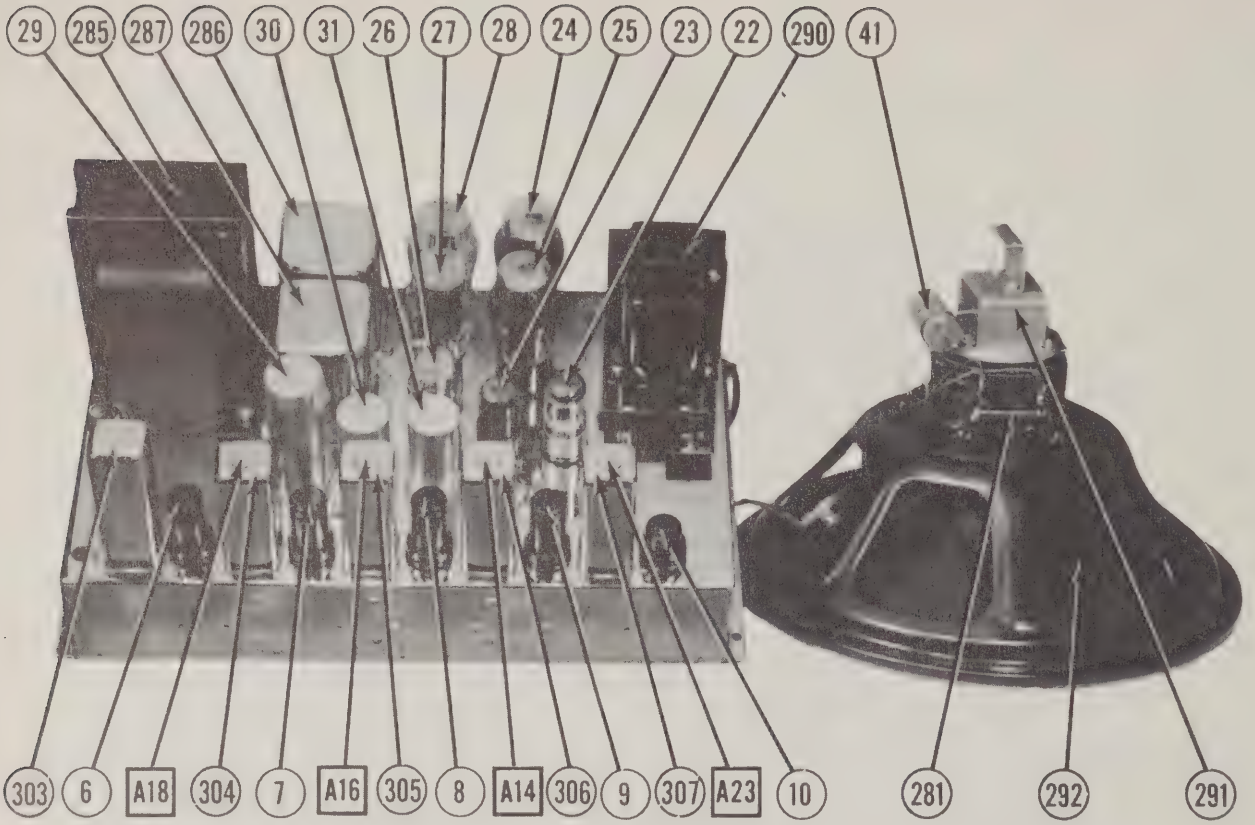
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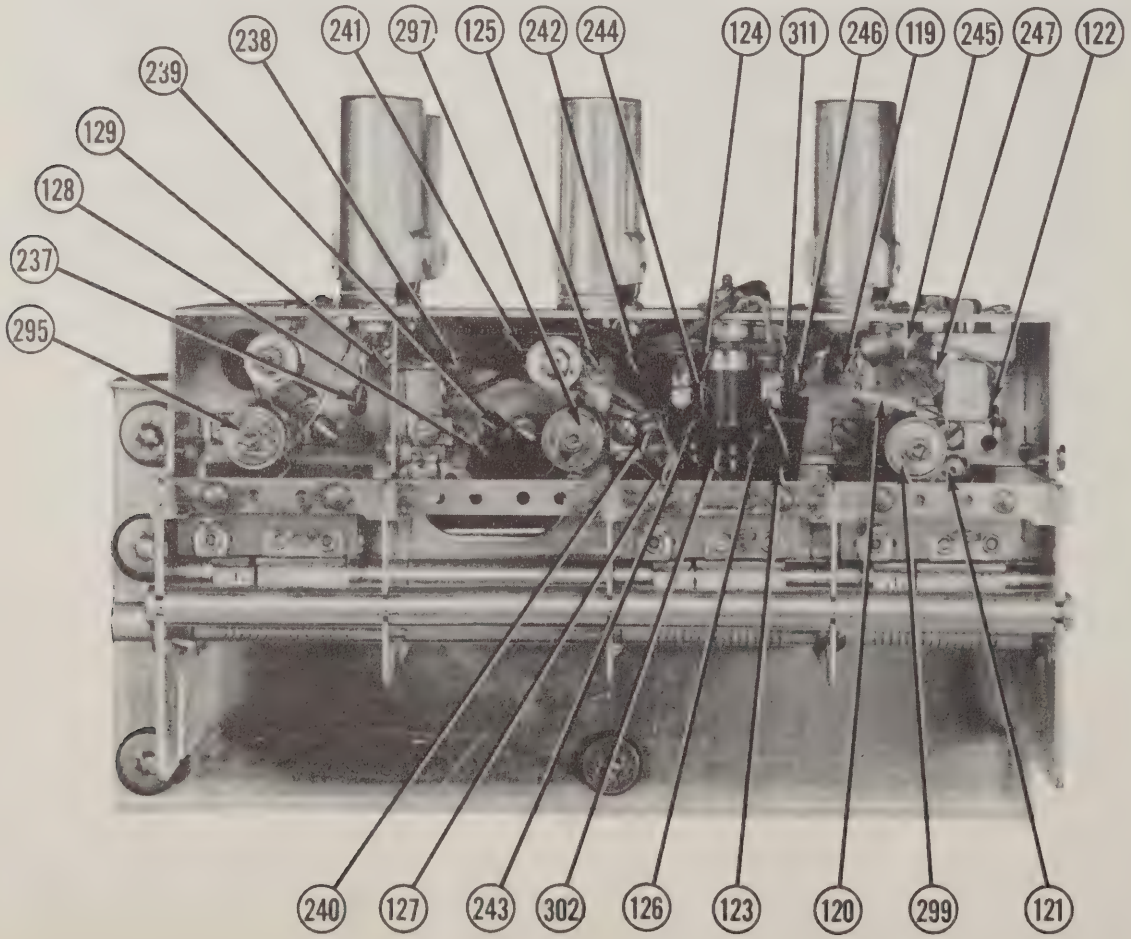
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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: SCOTT PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	FM RF Amp.	6AU6	6AU6	7BK	
2	FM Mixer	6AG5	6AG5	7BD	
3	FM Oscillator	6C4	6C4	6BG	
4	AM RF Amp.	6SK7	6SK7	8N	
5	AM Converter	6SA7	6SA7	8R	
6	FM IF Amp.	6SG7	6SG7	8BK	
7	FM IF Amp.	6SG7	6SG7	8BK	
8	FM Limiter	6SH7	6SH7	8BK	
9	FM Limiter	6SH7	6SH7	8BK	
10	FM Disc.	6H6	6H6	7Q	
11	AM IF Amp.	6SG7	6SG7	8BK	
12	AM Det.-AVC	6H6	6H6	7Q	
13	Tuning Eye	6E5	6E5	6R	
14	Mic. Amp.	6SJ7	6SJ7	8N	
15	Music Cont. Amp.	6B8	6B8	8E	
16	Treble Gate	6SG7	6SG7	8BK	
17	Treble Gate	6SG7	6SG7	8BK	
18	Bass Gate	6SJ7	6SJ7	8N	
19	1st AF Amp.	6SJ7	6SJ7	8N	
20	2nd AF Amp.	6SL7GT	6SL7GT	8BD	
21	Audio Coupling	6J5	6J5	6Q	
22	3rd AF Amp.	6J5	6J5	6Q	
23	Phase Inv.	6SN7GT	6SN7GT	8BD	
24	Power Output	6L6G	6L6G	7AC	
25	Power Output	6L6G	6L6G	7AC	
26	Voltage Reg.	VR-150	VR-150		
27	Rectifier	5U4G	5U4G	5T	
28	Rectifier	5U4G	5U4G	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	SCOTT PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
29	4	600	15B481	GL600-4	KR604	D-4-600	AP-46	Filter
30A	.30	450	15A17	AF88J	UP3345	DY-2x30-450	EL-240	▲ "
B	30	450						▲ "
31A	30	450	15K3010	AF444J	UP4445	DY-403*	EL-330	▲ "
B	30	450						▲ "
C	30	450			BR3045	M-2x20-450	UT-30	■ "
32	25	50	15B638	PRS250-25	BR255	M-25-50	TA-525	Cathode Bypass
33	25	25	15B795	PRS25-25	BR252A	M-25-25	TA-25	" "
34A	20	450	15A16	AF444J*	UP111145	DY-3x20-450*	EL-220	Decoupling
B	20	450						"
35	25	25	15B795	PRS25-25	BR252A	M-25-25	TA-25	Cathode Bypass
36	25	25	15B795	PRS25-25	BR255A	M-25-25	TA-25	" "
37	25	25	15B795	PRS25-25	BR255A	M-25-25	TA-25	" "
38	40	25	15A15	PRS25-50	BR502	M-50-25	TA-50	" "
39	40	25	15A15	PRS25-50	BR502	M-50-25	TA-50	" "
40A	.05	600	15A11	630-.05-.05	DYR60055	MPH-6-05	BP-2056	Line Filter
B	.05	600				MPH-6-05		" "
41	2	50						Audio Coupling
42	.25	600	15A14	630-.25	DA6025	XDMR6-.25	BP-256	" "
43	.25	600	15A14	630-.25	DA6025	XDMR6-.25	BP-256	" "
44	.05	600	15E1041	684-.05	DT6S5	ST-6-05	TC-15	" "
45	.05	600	15E1041	684-.05	DT6S5	ST-6-05	TC-15	" "
46	.25	600	15A14	684-.25	DT6P25	ST-6-25	TC-2	2nd Lim. Plate Decoup.
47	.25	600	15A14	684-.25	DT6P25	ST-6-25	TC-2	2nd Lim. Screen Bypass
48	.05	600	15A13	630-.05	DYR6005	XDMR6-.05	BP-56	Tuning Eye Grid Bypass
49	.01	600	15H2606	684-.01	DT6S1	ST-6-01	TC-11	RF Bypass Pwr. Supply
50	.25	600	15A14	630-.25	DA6025	XDMR6-.25	BP-256	1st Lim. Decoupling
51	.01	600	15H2606	684-.01	DT6S1	ST-6-01	TC-11	2nd FM IF Cathode Bypass
52	.01	600	15H2606	684-.01	DT6S1	ST-6-01	TC-11	1st FM IF Cathode Bypass
53	.05	600	15E1041	684-.05	DT6S5	ST-6-05	TC-15	Audio Coupling
54A	.05	600	15A11	630-.05-.05	DYR60055	XDMR6-2x.05	BP-2056	Bass Diode Filter
B	.05	600						" " "
55A	.25	600	15D3169	630-.25-.25	DYR6022	XDMR6-2x.25	BP-2256	Decoupling
B	.25	600						"
56A	.05	600	15A11	630-.05-.05	DYR60055	XDMR6-2x.05	BP-2056	Screen Bypass
B	.05	600						" "
57	.02	600	15E1001	684-.02	DT6S2	ST-6-02	TC-12	Audio Coupling
58	.001	600	15H2605	684-.001	DT6D1	ST-6-001	TC-21	Tone Compensation
59	.0015	600	15H2704	1467-.0015	1W5D15	MW.5-215	1FM-215	Audio Coupling
60	.0035	600	15E1897					Tone Compensation
61	.002	600	15H2602	684-.002	DT6D2	ST-6-002	TC-22	" "
62	.001	600	15H2605	684-.001	DT6D1	ST-6-001	TC-21	" "
63	.0005	600	15H2705	1468-.0005	DT6T5	ST-6-0005	TC-35	" "
64	.005	600	15H2603	684-.005	DT6D5	ST-6-005	TC-25	Audio Coupling
65	.001	600	15H2605	684-.001	DT6D1	ST-6-001	TC-21	" "
66	.005	600	15H2603	684-.005	DT6D5	ST-6-005	TC-25	Treble Diode Filter
67	.005	600	15H2603	684-.005	DT6D5	ST-6-005	TC-25	" " "
68	.002	600	15H2602	684-.002	DT6D2	ST-6-002	TC-22	Audio Coupling
69	.001	600	15H2605	684-.001	DT6D1	ST-6-001	TC-21	" "
70	.005	600	15H2603	684-.005	DT6D5	ST-6-005	TC-25	DC Blocking
71	.002	600	15H2602	684-.002	DT6D2	ST-6-002	TC-22	Phase Shift Cap.
72	.005	600	15H2603	684-.005	DT6D5	ST-6-005	TC-25	DC Blocking
73	.0005	600	15H2705	1468-.0005	DT6T5	ST-6-0005	TC-35	Phase Shift Cap.
74	.01	600	15H2606	684-.01	DT6S1	ST-6-01	TC-11	Tone Compensation
75	.5	600	15B636	630-.5	DA6050	XDMR6-.5	BP-506	" "
76	.02	600	15E1001	684-.02	DT6S2	ST-6-02	TC-12	Audio Coupling
77	.05	600	15E1041	684-.05	DT6S5	ST-6-05	TC-15	" "
78	.05	600	15E1041	684-.05	DT6S5	ST-6-05	TC-15	" "
79	.005	600	15H2603	684-.005	DT6D5	ST-6-005	TC-25	Tone Compensation
80	.01	600	15H2606	684-.01	DT6S1	ST-6-01	TC-11	" "
81	.005	600	15H2603	684-.005	DT6D5	ST-6-005	TC-25	" "
82	.002	600	15H2602	684-.002	DT6D2	ST-6-002	TC-22	" "
83	.05	600	15E1041	684-.05	DT6S5	ST-6-02	TC-15	Audio Coupling
84	.0025	600	15E1855	1467-.0025	1W5D25	MW.5-225		" "
85	.05	600	15E1041	684-.05	DT6S5	ST-6-05	TC-15	" "
86	.5	600	15B636	630-.5	DA6050	XDMR6-.5	BP-506	1st AF Screen Bypass
87	.005	600	15H2603	684-.005	DT6D5	ST-6-005	TC-15	AF Coupling
88	.25	600	15A14	630-.25	DA6025	XDMR6-.25	BP-256	Mic. Amp. Decoupling
89	.1	600	15H2706	684-.1	DT6P1	ST-6-1	TC-1	Mic. Amp. Screen Bypass
90	.01	600	15D3107	684-.01	DT6S1	ST-6-01	TC-11	Mic. Input Coupling
91	.1	600	15H2706	684-.1	DT6P1	ST-6-1	TC-1	RF Bypass
92	.02	600	15E1001	684-.02	DT6S2	ST-6-02	TC-12	AVC Filter
93	.02	600	15E1001	684-.02	DT6S2	ST-6-02	TC-12	TE Grid Bypass
94	.1	600	15H2706	684-.1	DT6P1	ST-6-1	TC-1	RF Bypass Pwr. Supply.
95A	.1	600	15A10	630-.1-.1-.1	DYR6111	XDMR6-3x.1	BP-316	AM 1st IF Decoupling
B	.1	600						" " " "
C	.1	600						" " " "
96A	.05	600	15B599	630-.05-.05-.05	DT6S5	ST-6-05	TC-15	Conv. Plate Decoup.
B	.05	600			DT6S5	ST-6-05	TC-15	" " "
C	.05	600			DT6S5	ST-6-05	TC-15	AVC Filter
97A	.1	600	15B796	630-.1-.1	DYR6011	XDMR6-2x.1	BP-216	Conv. Screen Bypass
B	.1	600						AM RF Decoup.
98	.02	600	15E1001	684-.02	DT6S2	ST-6-02	TC-12	AVC Filter
99A	.1	600	15B796	630-.1-.1	DYR6011	XDMR6-2x.1	BP-216	AM RF Screen Bypass
B	.1	600						AM RF Cathode Bypass
100	.02	600	15E1001	684-.02	DT6S2	ST-6-02	TC-12	AVC Filter
101	.001	600	15H2605	684-.001	DT6D1	ST-6-001	TC-22	Phono Coupling
102	6200	300	15C2714	1467-.006	1D5D6	MW.5-26	1FM-26	Voltage Reg. Bypass
103	240	500	15B602	1468-.00025	5W5T25	MO.5-325	1FM-325	RF Bypass
104	1300	300	15A415	1467-.0015	1W5D15	MW.5-215	1FM-215	De-emphasis
105A	100	500	15D2923	1468-.0001	5W5T1	MO.5-31	1FM-31	RF Bypass-Cer.
B	100	500		1468-.0001	5W5T1	MO.5-31	1FM-31	RF Bypass-Cer.
106	6200	300	15C2714	1467-.006	1D5D6	MW.5-26	1FM-26	2nd Lim. Screen Bypass
107	6200	300	15C2714	1467-.006	1D5D6	MW.5-26	1FM-26	Fil. Bypass
108	6200	300	15C2714	1467-.006	1D5D6	MW.5-26	1FM-26	1st Lim. Decoup.
109	6200	300	15C2714	1468-.006	1D5D6	MW.5-26	1FM-26	1st Lim. Screen Bypass
110	6200	300	15C2714	1467-.006	1D5D6	MW.5-26	1FM-26	Fil. Bypass
111	6200	300	15C2714	1467-.006	1D5D6	MW.5-26	1FM-26	2nd IF Plate Decoup.
112	6200	300	15C2714	1467-.006	1D5D6	MW.5-26	1FM-26	2nd IF Screen Bypass
113	6200	300	15C2714	1467-.006	1D5D6	MW.5-26	1FM-26	Fil. Bypass
114	6200	300	15C2714	1467-.006	1D5D6	MW.5-26	1FM-26	RF Bypass Pwr. Supply
115	6200	300	15C2714	1467-.006	1D5D6	MW.5-26	1FM-26	RF Bypass Pwr. Supply
116	6200	300	15C2714	1467-.006	1D5D6	MW.5-26	1FM-26	1st IF Plate Decoup.
117	6200	300	15C2714	1467-.006	1D5D6	MW.5-26	1FM-26	1st IF Screen Bypass
118	6200	300	15C2714	1467-.006	1D5D6	MW.5-26	1FM-26	Fil. Bypass
119A	500	500	15D2967	1468-.0005	5R5T5	MO.5-35	1FM-35	Osc. Plate Bypass-Cer.
B	500	500		1468-.0005	5R5T5	MO.5-35	1FM-35	" " " "
C	500	500		1468-.0005	5R5T5	MO.5-35	1FM-35	" " " "
120	36	500	15D3101	1468-.00004	5W5Q4	MO.5-44	1FM-44	Osc. Grid Cap.-Cer.
121	100	500	15D3095	1469-.0001	5R5T1	MOS.5-31	MS-31	Fixed Pad-Cer.
122	5	500	15D3086	1469-.000005	5R5V5	MOS.5-55	MS-55	Compensating Trimmer-Cer.
123	6200	300	15C2714	1467-.006	1D5D6	MW.5-26	1FM-26	Conv. Plate Decoup.
124	51	500	15A28	1467-.00005	5R5T5	MOS.5-45	MS-45	Fixed Trimmer
125A	500	500	15D2967	1468-.0005	5W5T5	MO.5-35	1FM-35	Conv. Cathode Bypass-Cer.
B	500	500		1468-.0005	5W5T5	MO.5-35	1FM-35	Conv. Screen Bypass-Cer.
C	500	500		1468-.0005	5W5T5	MO.5-35	1FM-35	Fil. Bypass-Cer.

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PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	SCOTT PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
126	2	500	15E1800					Osc. Coupling-Cer.
127	25	500	15D3165	1468-.000025	5W5Q25	MO.5-425	1FM-425	RF Coupling-Cer.
128	390	500	15B789	1468-.0004	5W5T4	MO.5-34	1FM-34	RF Plate Decoup.
129A	500	500	15D2967	1468-.0005	5W5T5	MO.5-35	1FM-35	RF Cathode Bypass-Cer.
B	500	500		1468-.0005	5W5T5	MO.5-35	1FM-35	RF Screen Bypass-Cer.
C	500	500		1468-.0005	5W5T5	MO.5-35	1FM-35	Fil. Bypass Cer.
130	240	500	15A31	1468-.00025	5W5T25	MO.5-325	1FM-325	Audio Coupling
131	240	500	15A31	1468-.00025	5W5T25	MO.5-325	1FM-325	Bass Diode Bypass
132	100	500	15A29	1468-.0001	5W5T1	MO.5-31	1FM-31	Fixed Trimmer
133	100	500	15A29	1468-.0001	5W5T1	MO.5-31	1FM-31	Phase Shift Cap.
134	240	500	15A31	1468-.00025	5W5T25	MO.5-325	1FM-325	" " "
135	51	500	15A28	1468-.00005	5W5Q5	MO.5-45	1FM-45	Osc. Grid Cap.
136	430	500	15A365					Fixed Pad
137	10	500	15B804	1467-.00001	5R5Q1	MOS.5-41	MS-41	Fixed Trimmer-Cer.
138	240	500	15A31	1468-.00025	5W5T25	MO.5-325	1FM-325	RF Coupling
139	240	500	15A31	1468-.00025	5W5T25	MO.5-325	1FM-325	" "
140	100	500	15A29	1468-.0001	5W5T1	MO.5-31	1FM-31	Tone Comp.
141	25	500	15E1849	1468-.000025	5W5Q25	MO.5-425	1FM-425	" "
328	6200	300	15C2714	1467-006	1D5D6	MW.5-26	1FM-26	2nd Lim. plate decoup.

*Do not use one section.

CONTROLS

ITEM No.	RATING RESIST-ANCE	RATING WATTS	SCOTT PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
142A	1 Meg.	½	70D2883	D13-137	M-63-Z	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 42A per instructions
143A	250KΩ	½	70D2884	D13-130X	T-42	Treble Control tapped @ 100KΩ
B	Shaft		Not Req.	A	Not Req.	Attach to 43A per instructions
144A	500KΩ	½	70D2885	D13-133	M-60-Z	Bass Control
B	Shaft		Not Req.	A	Not Req.	Attach to 44A per instructions
C	Switch		" "	41	SW-A	" " " " "
145	6KΩ	1	70D2886	W-7500	43-6000	Sensitivity Control
146A	1 Meg.	½	70E1718	D13-137	M-63-Z	Bass Limit Control
B	Shaft		Not Req.	A	Not Req.	Attach to 46A per instructions
147A	1 Meg.	½	70B568	D13-137	M-63-Z	Tuning Ind. Adj.
B	Shaft		Not Req.	A	Not Req.	Attach to 47A per instructions
148A	1 Meg.	½	70H2613	D13-137	M-63-Z	Noise Supp. Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 48A per instructions

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	SCOTT PART No.	IRC PART No.	IDENTIFICATION CODES
149	220KΩ	½	70A59	BTS-220K	Red-Red-Yl. AVC Network
150	330Ω	½	70E1199	BW-½-330	Or.-Or.-Br. AM-RF Cathode
151	15KΩ	2	70B818	BT-2-15K	Br.-Grn.-Or. AM-RF Screen Dropping
152	3300Ω	½	70E1192	BTS-3300	Or.-Or.-Red AM-RF Decoupling
153	220KΩ	½	70A59	BTS-220K	Red-Red-Yl. AVC Network
154	470KΩ	½	70A61	BTS-470K	Yl.-Vi.-Yl. AM Converter Grid
155	5100Ω	1	70B648	BTA-4700	Grn.-Br.-Red AM Converter Screen Dropping
156	39KΩ	½	70A53	BTS-39K	Or.-White-Or. AM Converter Plate Decoupling
157	20KΩ	½	70A52	BTS-22K	Red-Blk.-Or. AM Oscillator Grid
158	470KΩ	½	70A61	BTS-470K	Yl.-Vi.-Yl. AVC Network
159	220Ω	½	70E1289		Red-Red-Br. AM-IF Cathode
160	33KΩ	½	70E1209	BTS-33K	Or.-Or.-Or. AM-IF Screen Dropping
161	3300Ω	½	70E1192	BTS-3300	Or.-Or.-Red AM IF Plate Decoupling
162	47KΩ	½	70A54	BTS-47K	Yl.-Vi.-Or. Diode RF Filter
163	47KΩ	½	70A54	BTS-47K	Yl.-Vi.-Or. Diode Load
164	1 Meg.	½	70A63	BTS-1 Meg.	Br.-Blk.-Grn. AVC Network
165	2.2 Meg.	½	70A64	BTS-2.2 Meg.	Red-Red-Grn. Tuning Indicator Grid
166	560Ω	½	70A46	BTS-560	Grn.-Blue-Br. 1st AF Cathode
167	330KΩ	½	70H2615	BTS-330K	Or.-Or.-Yl. 1st AF Screen Dropping
168	47KΩ	½	70A54	BTS-47K	Yl.-Vi.-Or. 1st AF Plate Load
169	47KΩ	½	70A54	BTS-47K	Yl.-Vi.-Or. 1st AF Decoupling
170	160KΩ	½	70D2879	BTS-150K	Br.-Blue-Yl. Bleeder-See Note

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	SCOTT PART No.	IRC PART No.	IDENTIFICATION CODES
250	330KΩ	½	70H2615	BTS-330K	Or.-Or.-Yl. Phono Tone Compensation
251	15KΩ	2	70B818	BT-2-15K	Br.-Grn.-Or. Bleeder
253	470KΩ	½	70A61	BTS-470K	Yl.-Vi.-Yl. AM-RF Grid
253	68Ω	½	70E1195		Blue-Gray-Blk. 1st FM-IF Cathode
254	47KΩ	½	70A54	BTS-47K	Yl.-Vi.-Or. 1st FM IF Screen Dropping
255	5600Ω	½	70A50	BTS-5600	Grn.-Blue-Red 1st FM-IF Plate Decoupling
256	68Ω	½	70E1195		Blue-Gray-Blk. 2nd FM-IF Cathode
257	47KΩ	½	70A54	BTS-47K	Yl.-Vi.-Or. 2nd FM IF Screen Dropping
258	5600Ω	½	70A50	BTS-5600	Grn.-Blue-Red 2nd FM IF Plate Decoupling
259	10KΩ	½	70B760	BTS-10K	Br.-Blk.-Or. 1st FM Limiter Screen Dropping
260	18KΩ	2	70A68	BT-2-18K	Br.-Gray-Or. 1st FM Limiter Decoupling
261	2.2 Meg.	½	70A64	BTS-2.2 Meg.	Red-Red-Grn. TE Grid Filter
262	39KΩ	2	70D3083	BT-2-39K	Or.-White-Or. 2nd FM Limiter Screen Dropping
263	100KΩ	½	70A65	BTS-100K	Br.-Blk.-Yl. 2nd FM Limiter Plate Dropping
264	15KΩ	1	70B683	BTA-15K	Br.-Grn.-Or. Bleeder
265	100KΩ	½	70A65	BTS-100K	Br.-Blk.-Yl. Discriminator Diode Load
266	100KΩ	½	70A65	BTS-100K	Br.-Blk.-Yl. " " "
267	47KΩ	½	70A54	BTS-47K	Yl.-Vi.-Or. De-emphasis
268	10KΩ	½	70B760	BTS-10K	Br.-Blk.-Or. AF Cathode
269	220KΩ	½	70A59	BTS-220K	Red-Red-Yl. 3rd AF Grid
270	2400Ω	½	70A49	BTS-2200	Red-Yl.-hed 3rd AF Cathode
271	560Ω	½	70A46	BTS-560	Grn.-Blue-Br. Feedback
272	56Ω	½	70A43	BW-½-56	Grn.-Blue-Blk. Feedback
273	47KΩ	½	70A54	BTS-47K	Yl.-Vi.-Or. 3rd AF Plate Load
274	220KΩ	½	70A59	BTS-220K	Red-Red-Yl. Phase Inverter Grid
275	680Ω	½	70E1077	BTS-680	Blue-Gray-Br. Phase Inverter Cathode
276	6800Ω	½	70D2770	BTS-6800	Blue-Gray-Red " " "
277	7500Ω	½	70E1074		Vi.-Grn.-Red Phase Inverter Plate Load
278	47KΩ	½	70A54	BTS-47K	Yl.-Vi.-Or. Output Grid
279	47KΩ	½	70A54	BTS-47K	Yl.-Vi.-Or. " "
280	210Ω	10	70D2769	AB-200	Output Cathode
281	750Ω	20	70B990	DG-750	Filter
282	300Ω	10	70B682	AB-300	"
283	300Ω	10	70B682	AB-300	"
284	5000Ω	10	70D2919	AB-5000	"

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	SCOTT PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
285	117V AC @ 2.0A or 125V AC	900V CT @ .250A	5.0V AC @ 6.0A	6.6V AC @ 4.5A SEC. 4 7.0V AC @ 5.5A	91C2698			

FILTER CHOKE

ITEM NO.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ∿)	SCOTT PART NO.	STANCOR PART NO.	THORDARSON PART NO.	MERIT PART No.	INSTALLATION NOTES
286	.100A	70Ω	5.5 Henries	17B492	C-1709†	T20C53†	C-3196†	†Drill new mounting holes.
287	.150A	70Ω	"	17B492	C-2309†	T20C54†	C-3195†	

TONE CHOKE

ITEM NO.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ∿)	SCOTT PART NO.	STANCOR PART NO.	THORDARSON PART NO.	MERIT PART No.	INSTALLATION NOTES
288A		275Ω	1.3 Henries	17H2701				
B		80Ω	.4 Henries					
289		235Ω	11 Henries	17B591				

TRANSFORMER (OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	SCOTT PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	INSTALLATION NOTES
290	5600Ω CT	16Ω tapped @ 8Ω	150Ω CT	.7Ω tapped @ .4Ω	91C2699	A-3800†	T22870†	A-3131†	†Drill new mounting holes.

PARTS LIST AND DESCRIPTIONS (Continued)

171	47KΩ	½	70A54	BTS-47K	Yl.-Vi.-Or. Tone Compensation
172	100KΩ	½	70A58	BTS-100K	Br.-Blk.-Yl. " "
173	100KΩ	½	70A58	BTS-100K	Br.-Blk.-Yl. " "
174	470KΩ	½	70A61	BTS-470K	Yl.-Vi.-Yl. 2nd AF Grid
175	2400Ω	½	70A49	BTS-2200	Red-Yl.-Red 2nd AF Cathode
176	10KΩ	½	70A419	BTS-10K	Br.-Blk.-Or. 2nd AF Cathode
177	5100Ω	½	70D2878	BTS-4700	Grn.-Br.-Red Decoupling
178	2400Ω	½	70A49	BTS-2400	Red-Yl.-Red Bass Amp. Cathode
179	120KΩ	½	70E1213	BTS-120K	Br.-Red-Yl. Tone Compensation
180	100KΩ	½	70A58	BTS-100K	Br.-Blk.-Yl. " "
181	120KΩ	½	70E1213	BTS-120K	Br.-Red-Yl. " "
182	240KΩ	½	70D3084	BTS-220K	Red-Yl.-Yl. Tone Compensation
183	240KΩ	½	70D3084	BTS-220K	Red-Yl.-Yl. " "
184	47KΩ	½	70A54	BTS-47K	Yl.-Vi.-Or. Bass Amp. Plate Load
185	47KΩ	½	70A54	BTS-47K	Yl.-Vi.-Or. " " " "
186	220KΩ	½	70A59	BTS-220K	Red-Red-Yl. Tone Compensation
187	100KΩ	½	70A58	BTS-100K	Br.-Blk.-Yl. 2nd AF Plate Load
188	220KΩ	½	70A59	BTS-220K	Red-Red-Yl. Tone Compensation
189	100KΩ	½	70A58	BTS-100KΩ	Br.-Blk.-Yl. AF Grid
190	1 Meg.	½	70A63	BTS-1 Meg.	Br.-Blk.-Grn. Mic. Amp. Grid
191	2400Ω	½	70A49	BTS-2200	Red-Vi.-Red Mic. Amp. Cathode
192	2.2 Meg.	½	70A64	BTS-2.2 Meg.	Red-Red-Grn. Mic. Amp. Screen Dropping
193	470KΩ	½	70A61	BTS-470K	Yl.-Vi.-Yl. Mic. Amp. Plate Load
194	100KΩ	½	70A58	BTS-100K	Br.-Blk.-Yl. Mic. Amp. Decoupling
195	1 Meg.	½	70A63	BTS-1 Meg.	Br.-Blk.-Grn. Tuning Indicator Plate Load
196	470KΩ	½	70A61	BTS-470K	Yl.-Vi.-Yl. Series Tun. Ind. Sens. Cont.
197	240KΩ	½	70D3084	BTS-220K	Red-Yl.-Yl. Tone Compensation
198	560KΩ	½	70A62	BTS-560K	Grn.-Blue-Yl. " "
199	1 Meg.	½	70A63	BTS-1 Meg.	Br.-Blk.-Grn. " "
200	2.2 Meg.	½	70A64	BTS-2.2 Meg.	Red-Red-Grn. " "
201	220KΩ	½	70A59	BTS-220K	Red-Red-Yl. " "
202	470KΩ	½	70A61	BTS-470K	Yl.-Vi.-Yl. " "
203	330KΩ	½	70H2615	BTS-330K	Or.-Or.-Yl. Audio Voltage Divider
204	220KΩ	½	70A59	BTS-220K	Red-Red-Yl. Audio Voltage Divider
205	220KΩ	½	70A59	BTS-220K	Red-Red-Yl. " " " "
206	100KΩ	½	70A58	BTS-100K	Br.-Blk.-Yl. " " " "
207	100Ω	½	70E1196	BW-½-100	Br.-Blk.-Br. Music Control Amp. Control
208	20 Meg.	½	70H2709	BTS-22 Meg.	Red-Blk.-Blue Treble Diode Load
209	470KΩ	½	70A61	BTS-470K	Yl.-Vi.-Yl. Treble Diode Filter
210	1 Meg.	½	70A63	BTS-1 Meg.	Br.-Blk.-Grn. Treble Diode Filter
211	1.5 Meg.	½	70B646	BTS-1.5 Meg.	Br.-Grn.-Grn. Bass Diode Load
212	1 Meg.	½	70A63	BTS-1 Meg.	Br.-Blk.-Grn. Bass Diode Filter
213	1 Meg.	½	70A63	BTS-1 Meg.	Br.-Blk.-Grn. " " "
214	220KΩ	½	70A59	BTS-220K	Red-Red-Yl. Tone Compensation
215	2400Ω	½	70A49	BTS-2200	Red-Yl.-Red Gate Cathode
216	75KΩ	½	70E1213	BTS-68K	Vi.-Grn.-Or. Bleeder-See Note
217	560KΩ	½	70A62	BTS-560K	Grn.-Blue-Yl. Music Control Amp. Screen Dropping
218	47KΩ	½	70A54	BTS-47K	Yl.-Vi.-Or. Music Control Amp. Plate Load
219	160KΩ	½	70D2879	BTS-150K	Br.-Blue-Yl. Music Control Amp. Plate Load Decoupling
220	3000Ω	10	70B681	AB-3000	
221	100KΩ	½	70A58	BTS-100K	Br.-Blk.-Yl. Tone Compensation
222	100KΩ	½	70A58	BTS-100K	Br.-Blk.-Yl. Phase Shifter
223	22KΩ	½	70H2708	BTS-22K	Red-Red-Or. Bleeder
224	100KΩ	1	70A65	BTA-100K	Br.-Blk.-Yl. 1st Treble Gate Screen Dropping
225	220KΩ	½	70A59	BTS-220K	Red-Red-Yl. 1st Treble Gate Plate Load
226	100KΩ	½	70A65	BTS-100K	Br.-Blk.-Yl. Phase Shifter
227	22KΩ	½	70H2708	BTS-22K	Red-Red-Or. Bleeder
228	100KΩ	1	70A65	BTA-100K	Br.-Blk.-Yl. 2nd Treble Gate Screen Dropping
229	220KΩ	½	70A59	BTS-220K	Red-Red-Yl. 2nd Treble Gate Plate Load
230	5.6 Meg.	½	70D3106	BTS-5.6 Meg.	Grn.-Blue-Grn. Phase Shifter
231	1 Meg.	½	70A63	BTS-1 Meg.	Br.-Blk.-Grn. Phase Shifter
232	330KΩ	½	70H2615	BTS-330K	Or.-Or.-Yl. Bass Gate Grid
233	10KΩ	½	70A419	BTS-10K	Br.-Blk.-Or. Bleeder
234	100KΩ	1	70A65	BTA-100K	Br.-Blk.-Yl. Bass Gate Screen Dropping
235	220KΩ	½	70A59	BTS-220K	Red-Red-Yl. Bass Gate Plate Load
236	10KΩ	10	70B760	AB-10K	Bleeder
237	68Ω	½	70E1195		Blue-Gray-Blk. FM-RF Cathode
238	39KΩ	½	70A53	BTS-39K	Or.-White-Or. FM-RF Screen Dropping
239	5100Ω	½	70D2878	BTS-4700	Grn.-Br.-Red FM-RF Decoupling
240	470KΩ	½	70A61	BTS-470K	Yl.-Vi.-Yl. FM Mixer Grid
241	1000Ω	½	70A47	BTS-1000	Br.-Blk.-Red FM Mixer Cathode
242	1 Meg.	½	70A63	BTS-1 Meg.	Br.-Blk.-Grn. FM Mixer Screen Dropping
243	33KΩ	½	70E1209	BTS-33K	Or.-Or.-Or. FM Mixer Plate Decoupling
244	56KΩ	½	70A55	BTS-56K	Grn.-Blue-Or. 1st FM-IF Transformer Shunt
245	47KΩ	½	70A54	BTS-47K	Yl.-Vi.-Or. 1st FM Oscillator Grid
246	5100Ω	1	70B648	BTA-4700	Grn.-Br.-Red 1st FM Oscillator Plate Load
247	47Ω	½	70A420		Yl.-Vi.-Blk. Heater
248	2.2 Meg.	½	70A64	BTS-2.2 Meg.	Red-Red-Grn. Series Recorder
249	470KΩ	½	70A61	BTS-470K	Yl.-Vi.-Yl. Phono Shunt

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PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: SCOTT PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	VC IMP.				
291A	PM	16Ω	85B2688	ST-122# Mod. HNP51		#Add 16Ω to 500Ω transformer to match output of receiver.
B	High frequency horn inside of Item #292.					
	CONE DIA.	VC DIA.				
292	14-1/4"	2-1/8"				

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: SCOTT PART No.	MEISSNER PART No.	
293	Loop Load. Coil		3Ω	20D2916		
294	BC Ant.Coil	20Ω	3.5Ω	20D2743 20D2744		Primary Secondary
295	FM " "	0Ω	0Ω	20D2747		
296	BC RF Coil	5Ω	4Ω	20D2745		
297	FM " "	0Ω	0Ω	20D2748		
298	BC Osc.Coil		3Ω	20D2746		
299	FM " "		0Ω	20D2749		
300	BC Input IF	4Ω	4Ω	20D2750		
301	BC Output IF	4Ω	4Ω	20D2751		
302	FM IF Coup.	.1Ω	0Ω	20D2752		
303	FM 1st IF	0Ω		20D2753		
304	FM 2nd IF	0Ω		20D2754		
305	FM 3rd IF	0Ω		20D2755		
306	FM 4th IF	0Ω		20D2756		
307	Disc. Trans.	0Ω	0Ω	20D2757		
308	RF Choke		0Ω	17D2764		
309	" "		0Ω	17D2764		
310	" "		0Ω	17D2764		
311	Fil. Choke		0Ω	17D2764		
312	" "		0Ω	17D2764		
313	RF Choke		.1Ω	17B761		
314	Fil. Choke		0Ω	17D2764		
315	Fil. Choke		0Ω	17B761		
316	Fil. Choke		0Ω	17B761		

DIAL LIGHT

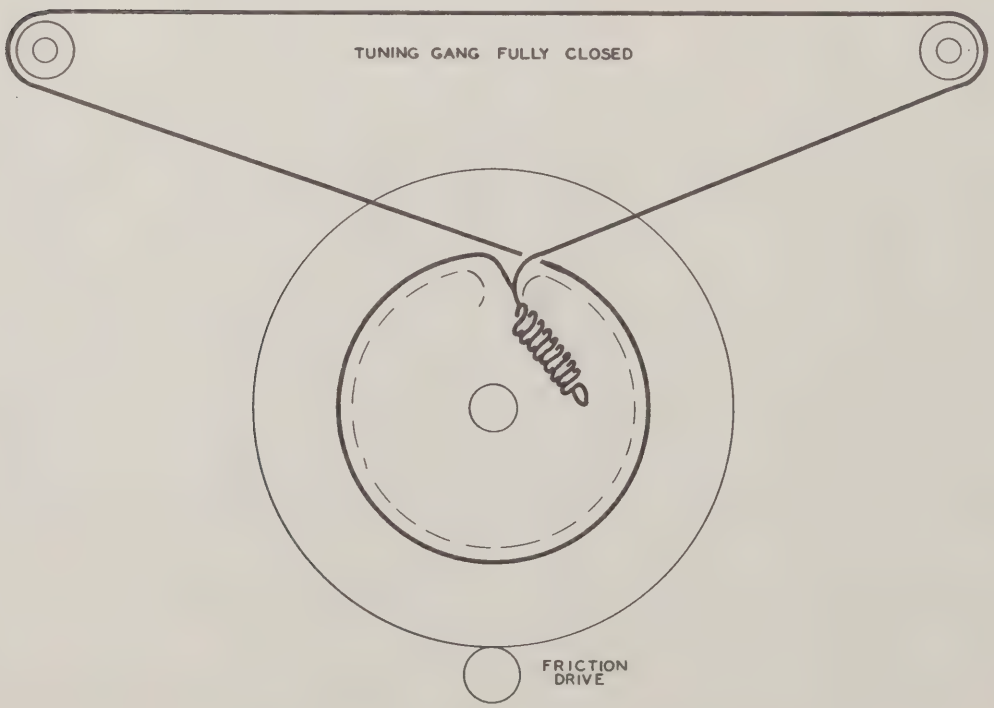
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: SCOTT PART No.		INSTALLATION NOTES
317-322	Bayonet	6-8	0.15	Brown	49A168		Type 47

MISCELLANEOUS

ITEM No.	PART NAME	SCOTT PART No.	NOTES
323	Switch	89D2992	Phono-Band
324	"	89D2891	Tone
325	"	89D2942	Ant.-Loop
326	Fuse	37A162	3 Amp. (3AG)
327	3 Gang Var. Cap.	15D2887	(13-417MMF) each section)
A5	Trimmer	15A18	BC Osc. Adj.
A6	"	15B2347	BC RF Adj.
A7	"	15B2347	BC Ant. Adj.
A8	Padder	15B862	BC Osc. Adj.
A12	Trimmer	15B2347	BC Loop Adj.
A24	"	15A18	FM Osc. Adj.
A25	"	15B2347	FM RF Adj.
A26	"	15B2347	FM Ant. Adj.
	Dial Pointer	29D2804	Assembly
	Dial Scale	29D2806	Glass
	Knob	47B659	Control
	"	47B660	Main Tuning

STAGE GAIN MEASUREMENTS		
ANTENNA TO RF GRID	5.5X	600KC
RF GRID TO CONVERTER GRID	5X	600KC
CONVERTER GAIN	4X	IN 600KC OUT 455KC
INPUT IF TRANSFORMER	1.5X	455KC
IF TUBE	140X	455KC
OUTPUT IF TRANSFORMER	.45X	455KC
1st AUDIO	100X	400 ∿
2nd AUDIO	2.5X	400 ∿
3rd AUDIO	40X	400 ∿
GRID CATHODE FOLLOWER TO 6J5 TUBE (22)	.9X	400 ∿
4th AUDIO	8X	400 ∿
INVERTER	.9X	400 ∿
OUTPUT	18X	400 ∿
MIC. PREAMP.	300X	400 ∿
6B8 TONE SWITCH (N POSITION)	60X	400 ∿

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by connecting negative (-) 3 volts to the AVC line.



VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.

VOLTAGE READINGS

	Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
‡	1	6AU6	0V.	0V.	0V.	7VAC	250VDC	150VDC	1VDC	-	-
‡	2	6AG5	0V.	1.5VDC	0V.	7VAC	260VDC	67VDC	1.5VDC	-	-
‡	3	6C4	125VDC	0V.	7VAC	0V.	125VDC	-5VDC§	0V.	-	-
	4	6SK7	0V.	0V.	0V.	0V.	20VDC	135VDC	7VAC	270VDC	-
	5	6SA7	0V.	0V.	255VDC	100VDC	-22VDC§	0V.	7VAC	0V.	-
‡	6	6SG7	0V.	0V.	1VDC	0V.	1VDC	140VDC	6.6VAC	250VDC	-
‡	7	6SG7	0V.	0V.	1VDC	0V.	1VDC	130VDC	6.6VAC	250VDC	-
‡	8	6SH7	0V.	0V.	0V.	0V.	0V.	90VDC	6.6VAC	175VDC	-
‡	9	6SH7	0V.	0V.	0V.	-1.2VDC	0V.	70VDC	6.6VAC	75VDC	-
‡	10	6H6	0V.	0V.	-9VDC	1.5VDC	-2.6VDC	-5.2VDC	6.6VAC	0V.	-
	11	6SG7	0V.	0V.	20VDC	0V.	20VDC	260VDC	7VAC	300VDC	-
	12	6H6	0V.	0V.	-.4VDC	0V.	-.4VDC	0V.	7VAC	0V.	-
	13	6E5	7VAC	25VDC	-.6VDC	280VDC	0V.	0V.	-	-	-
**	14	6SJ7	0V.	0V.	1VDC	0V.	1VDC	20VDC	7VAC	92VDC	-
	15	6B8	0V.	0V.	107VDC	105VDC	0V.	20VDC	7VAC	1VDC	0V.
	16	6SG7	0V.	0V.	1VDC	0V.	1VDC	46VDC	7VAC	26VDC	-
	17	6SG7	0V.	0V.	1VDC	0V.	1VDC	43VDC	7VAC	40VDC	-
	18	6SJ7	0V.	0V.	1VDC	0V.	1VDC	24.5VDC	7VAC	150VDC	-
	19	6SJ7	0V.	0V.	1.25VDC	0V.	1.25VDC	45VDC	7VAC	53VDC	-
	20	6SL7GT	0V.	200VDC	2VDC	3VDC	190VDC	9VDC	7VAC	0V.	-
	21	6J5	0V.	7VAC	295VDC	0V.	0V.	0V.	7VAC	12.5VDC	-
	22	6J5	0V.	0V.	175VDC	0V.	0V.	0V.	6.6VAC	7VDC	-
	23	6SN7GT	30VDC	260VDC	13VDC	30VDC	260VDC	13VDC	6.6VAC	0V.	-
	24	6L6G	0V.	0V.	450VDC	310VDC	0V.	0V.	6.6VAC	23VDC	-
	25	6L6G	0V.	0V.	450VDC	310VDC	0V.	0V.	6.6VAC	23VDC	-
	26	VR-150	0V.	0V.	150VDC	0V.	150VDC	0V.	150VDC	0V.	-
	27	5U4G	0V.	0V.	500VDC	0V.	450VAC	0V.	450VAC	0V.	500VDC	-
	28	5U4G	0V.	0V.	500VDC	0V.	450VAC	0V.	450VAC	0V.	500VDC	-

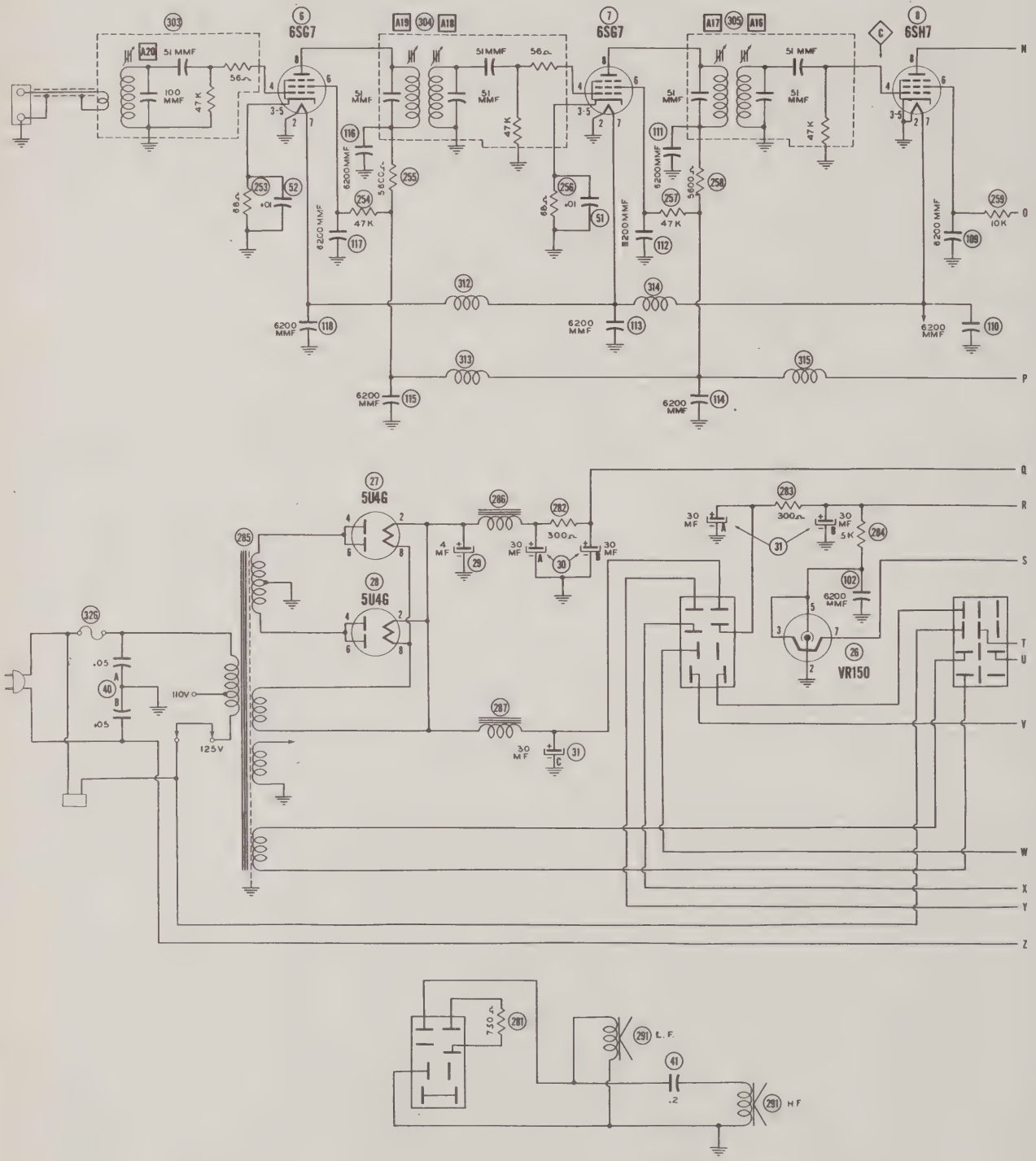
RESISTANCE READINGS

	Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
‡	1	6AU6	0Ω	0Ω	0Ω	.05Ω	12KΩ	46KΩ	68Ω	-	-
‡	2	6AG5	470KΩ	1KΩ	0Ω	.05Ω	10.3KΩ	1 Meg.	1KΩ	-	-
‡	3	6C4	12.1KΩ	0Ω	.05Ω	0Ω	12KΩ	47KΩ	0Ω	-	-
	4	6SK7	0Ω	0Ω	0Ω	2 Meg.	6.3KΩ	15KΩ	.05Ω	10KΩ	-
	5	6SA7	0Ω	0Ω	46KΩ	12KΩ	20KΩ	.7Ω	.05Ω	2 Meg.	-
‡	6	6SG7	0Ω	0Ω	68Ω	47KΩ	68Ω	54KΩ	.05Ω	12.6KΩ	-
‡	7	6SG7	0Ω	0Ω	68Ω	47KΩ	68Ω	54KΩ	.05Ω	12.6KΩ	-
‡	8	6SH7	0Ω	0Ω	0Ω	47KΩ	0Ω	35KΩ	.05Ω	23KΩ	-
‡	9	6SH7	0Ω	0Ω	0Ω	27KΩ	0Ω	11KΩ	.05Ω	110KΩ	-
‡	10	6H6	0Ω	0Ω	160KΩ	200KΩ	160KΩ	100KΩ	.05Ω	0Ω	-
	11	6SG7	0Ω	0Ω	6.2KΩ	530KΩ	6.2KΩ	40KΩ	.05Ω	10KΩ	-
	12	6H6	0Ω	0Ω	INF.	0Ω	94KΩ	INF.	.05Ω	0Ω	-
	13	6E5	.05Ω	1 Meg.	1 Meg.	12Ω	0Ω	0Ω	-	-	-
**	14	6SJ7	0Ω	0Ω	2.4KΩ	1 Meg.	2.4KΩ	2.3 Meg.	.05Ω	580KΩ	-
	15	6B8	0Ω	0Ω	210KΩ	1.5 Meg.	20 Meg.	65KΩ	.05Ω	100Ω	1 Meg.
	16	6SG7	0Ω	0Ω	100Ω	22.5 Meg.	100Ω	19KΩ	.05Ω	230KΩ	-
	17	6SG7	0Ω	0Ω	100Ω	22.5 Meg.	100Ω	19KΩ	.05Ω	230KΩ	-
	18	6SJ7	0Ω	0Ω	100Ω	4 Meg.	100Ω	9KΩ	.05Ω	230KΩ	-
	19	6SJ7	0Ω	0Ω	560Ω	0Ω	560Ω	380KΩ	.05Ω	150KΩ	-
	20	6SL7GT	315KΩ	100KΩ	2.4KΩ	500KΩ	110KΩ	12.4KΩ	.05Ω	0 Ω	-
	21	6J5	0Ω	.05Ω	12KΩ	0Ω	70KΩ	INF.	0Ω	10KΩ	-
	22	6J5	0Ω	0Ω	54KΩ	INF.	220KΩ	INF.	.05Ω	2.4KΩ	-
	23	6SN7GT	220KΩ	14.5KΩ	7.6KΩ	220KΩ	14.5KΩ	7.6KΩ	.05Ω	0Ω	-
	24	6L6G	0Ω	0Ω	7KΩ	7KΩ	47KΩ	INF.	.05Ω	210Ω	-
	25	6L6G	0Ω	0Ω	7KΩ	7KΩ	47KΩ	INF.	.05Ω	210Ω	-
	26	VR-150	0Ω	0Ω	12KΩ	INF.	12KΩ	INF.	12KΩ	INF.	-
	27	5U4G	0Ω	7KΩ	INF.	29Ω	INF.	29Ω	INF.	7KΩ	-
	28	5U4G	0Ω	7KΩ	INF.	27Ω	INF.	27Ω	INF.	7KΩ	-

**VOLTAGE AND RESISTANCE READINGS TAKEN WITH BAND SWITCH ON MIKE POSITION.
SENSITIVITY AND VOLUME CONTROLS AT MINIMUM.
MUSIC CONTROL SWITCH AT "M"
BASS CONTROL AT EXTREME CLOCKWISE POSITION.

‡ VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.
§TAKEN WITH VACUUM TUBE VOLTMETER.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.



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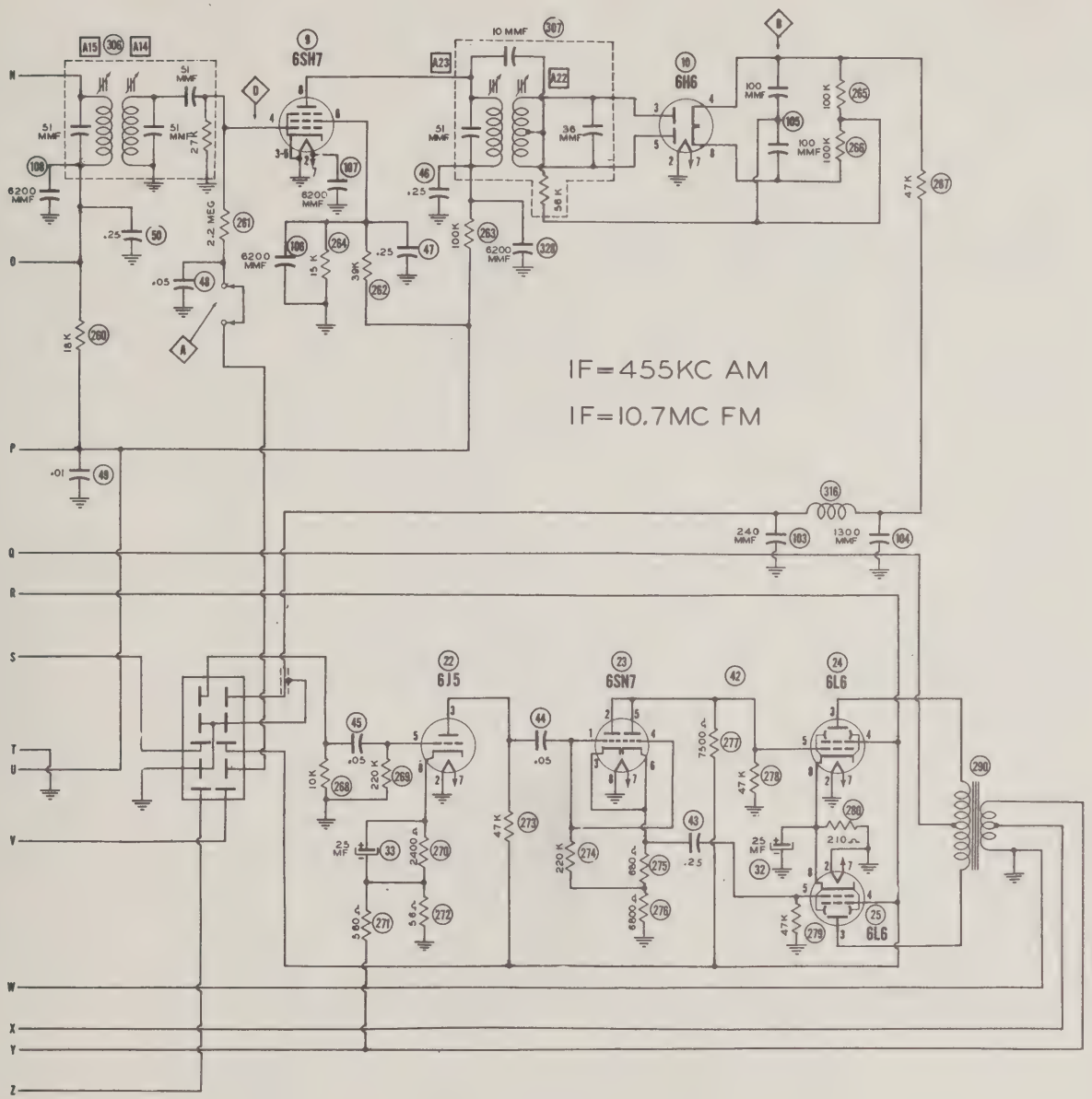

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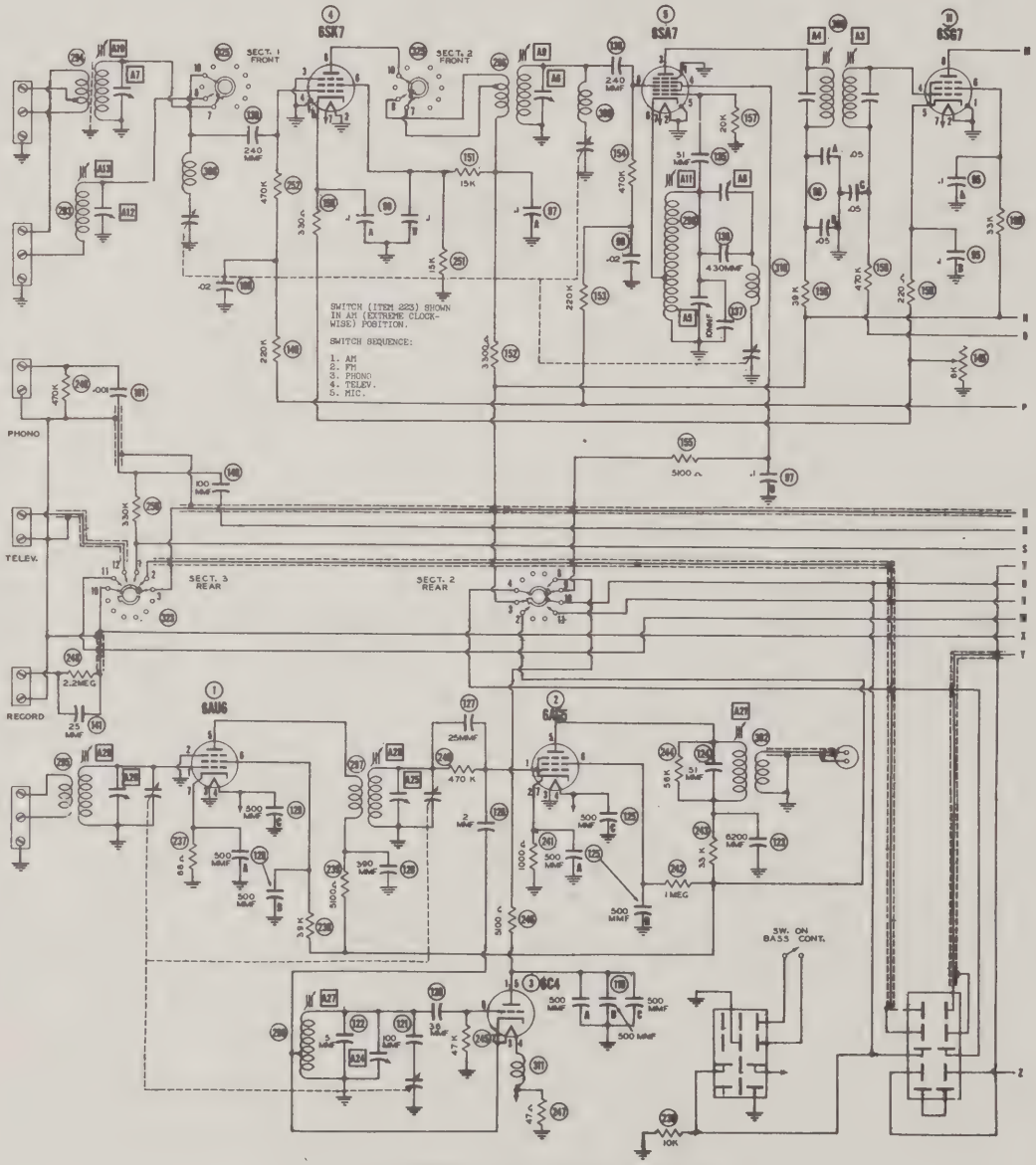

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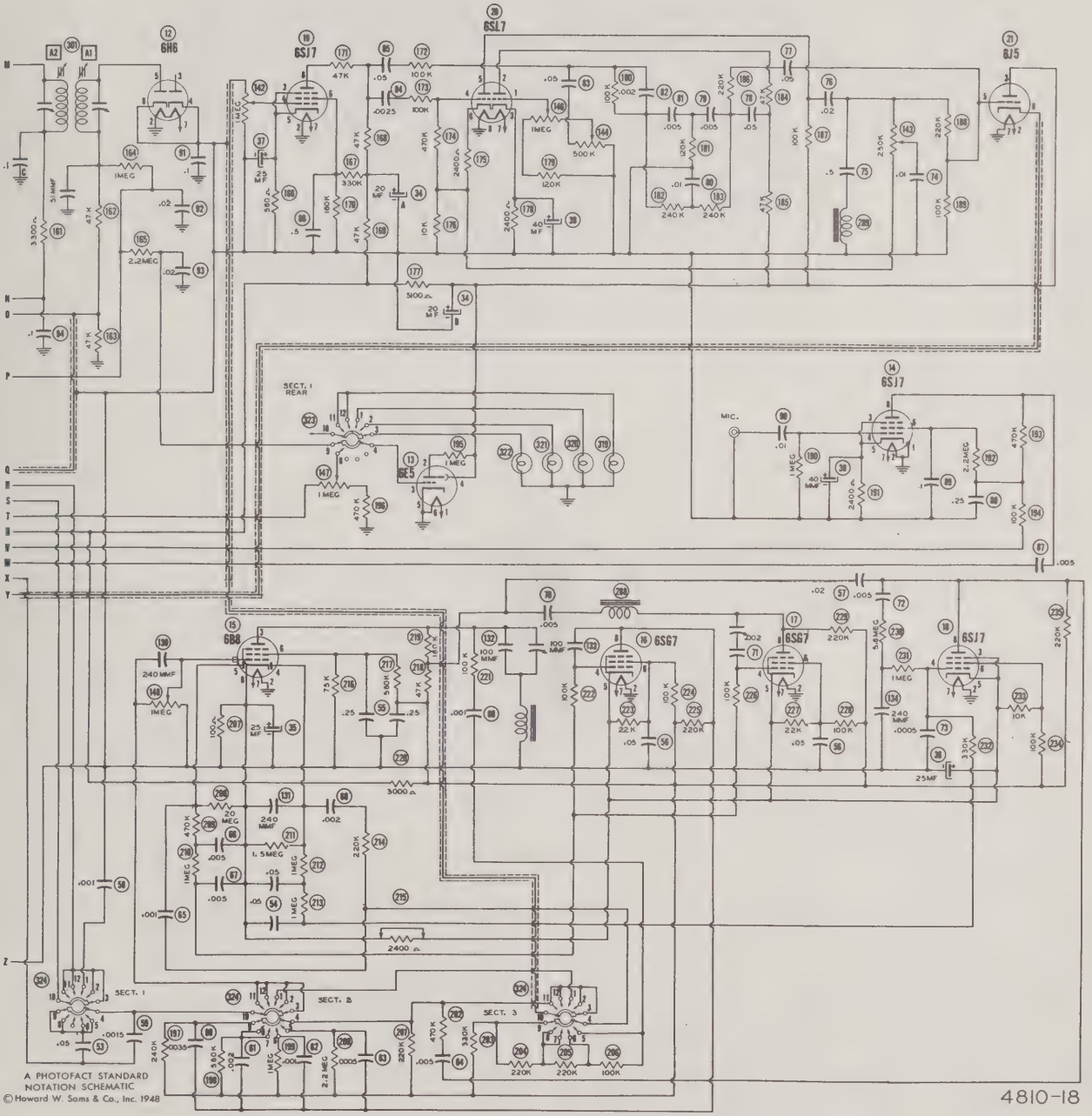
6H6
6SJ7
6SL7
6J5
6SJ7
6SE5
MIC.
6SJ7
6B8
6SG7
6SG7
6SJ7
SECT. 1
REAR
SECT. 1
SECT. 2
SECT. 3
A PHOTOFACT STANDARD
NOTATION SCHEMATIC
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4810-18

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to zero mark on the top logging scale.

Set sensitivity, treble, bass and volume controls at maximum. Turn music control switch to "N". Output of signal generator should be no higher than necessary to obtain output reading. Use insulated alignment screwdriver for all adjustments.

AM ALIGNMENT

Connect output meter across terminals 1 and 5 of speaker receptacle when Jensen 15" coaxial speaker is used or terminals 3 & 5 when 15" ton-sonic single speaker is used.

RMA Dummy consists of 200MMFD cap. in series with 20 microhenry choke with choke shunted by 400 MMFD cap. in series with 400Ω carbon resistor.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.05 MFD.	High side to Pin 8 (grid) 6SA7. Low side to chassis.	455KC	AM	Tuning cap. fully open.	(See pre-alignment instructions)	A1,A2, A3,A4.	Adjust for maximum output.
2	RMA Dummy	Low side to AM Ant. terminal (loop switch counter-clockwise) Low side to chassis.	1500KC	"	1500KC	"	A5,A6, A7	Adjust for maximum output in order given.
3	"	"	600KC	"	600KC	"	A8,A9, A10	Adjust for maximum output Repeat steps 2 & 3 until no further improvement can be made. Check calibration at 1000KC. If it is off Step 4 must be done next. If calibration is satisfactory continue with Step 5.
4	"	"	1000KC	"	1000KC	"	A11	Adjust for maximum output. Repeat Steps 2, 3 & 4 until no further improvement can be made.
5		Connect loop ant. to loop terminals. Turn loop switch clockwise. Use radiation loop.	1500KC	"	Tune for maximum output.	"	A12	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
6		"	600KC	"	"	"	A13	Adjust for maximum output Repeat Steps 5 & 6 until no further improvement can be made.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

To check band pass in Step 8 tune signal generator 75KC above 10.7MC (10.775Mc.) and record meter reading. Tune signal generator to 75KC below 10.7MC (10.625Mc.) and record meter reading. These two readings should be equal. If they are not a slight adjustment of A23 should be made to make them equal. Then A22 must be adjusted for zero deflection. Set this adjustment carefully as distortion on FM will result if incorrectly made.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
7	.01 MFD.	High side to Pin 1 (grid) 6AG5 FM Mixer Tube (2). Low side to chassis.	10.7MC (unmodulated)	FM	Tuning cap. fully open.	DC probe to Point (A). Common to chassis Remove jumper from Point (A).	A14,A15, A16,A17, A18,A19, A20,A21	Remove FM Osc. Tube 6C4 (3). Adjust for maximum deflection.
8	.01 MFD.	"	"	"	"	Replace jumper at Point (A). DC probe to Point (B). Common to chassis.	A22, A23	If meter reads zero no adjustment of A22 or A23 is necessary. If meter reads plus or minus detune A22 slightly. Adjust A23 for maximum deflection. Then adjust A22 for zero deflection. Check for correct band pass per prealignment instructions. Continue with FM-RF Alignment Step 11.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use freq. modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

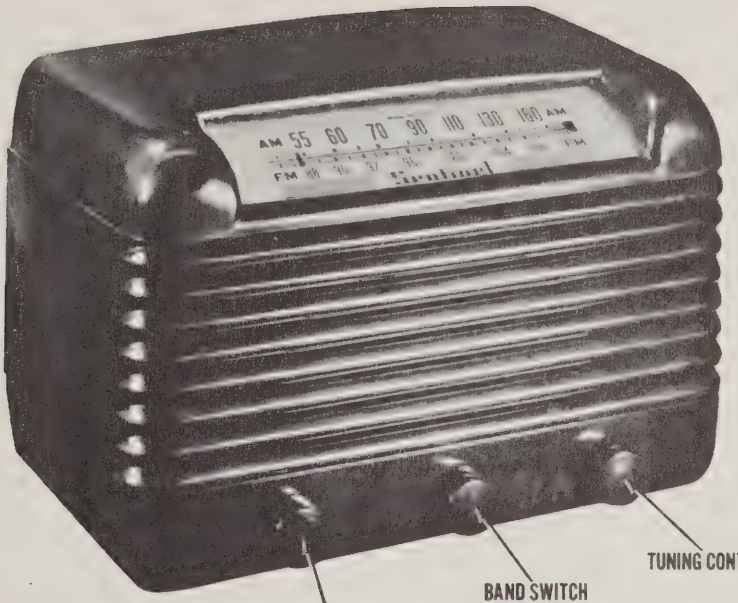
	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
7	.01 MFD.	High side to Pin 4 (grid) 6SG7 1st FM IF Tube (6). Low side to chassis.	10.7MC (freq. modulated)	FM	Tuning cap. fully open.	Vertical input in series with 220K Ω resistor to Point (C). Ground to chassis.	A16,A17 A18,A19	Remove FM Osc. Tube (3). Adjust for maximum amplitude, symmetry & coincidence of pattern per Fig. 1.
8	.01 MFD.	High side to Pin 1 (grid) 6AG5 FM Mixer Tube (2). Low side to chassis.	"	"	"	"	A20, A21	Remove FM Osc. Tube (3). Adjust for maximum amplitude, symmetry & coincidence of pattern per Fig. 1. Attenuate signal from signal generator to give just enough signal for deflection.
9	.01 MFD	"	"	"	"	Vertical input in series with 220K Ω resistor to Point (D). Ground to chassis.	A14, A15	"
10	.01 MFD	"	"	"	"	Vertical input to Point (B). Ground to chassis.	A22, A23.	Alternately adjust A23 for maximum amplitude and A22 for maximum straightness of crossover lines with crossover occurring at center of pattern per Fig. 2. Continue with FM RF Alignment, Step 11.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO D'AL SETTING	OUTPUT METER	ADJUST	REMARKS
11	50Ω carbon res.	High side to FM ant. terminal. Low side to chassis. (Connect center FM ant. terminal to chassis.)	106MC (unmodulated)	FM	106MC	DC probe to Point (A). Common to chassis. Remove jumper from Point (A).	A24,A25, A26	Replace FM Osc. Tube 6C4 (3). Adjust for maximum deflection.
12	"	"	90MC	"	90MC	"	A27,A28 A29	Adjust for maximum deflection. Repeat Steps 11 & 12 until no further improvement can be made.

FIG. 1

FIG. 2



SENTINEL MODEL 315-W

TRADE NAME	Sentinel, Models 315-I, 315-W
MANUFACTURER	Sentinel Radio Corp., 2100 W. Dempster St., Evanston, Ill.
TYPE SET	AC-DC Operated AM-FM Superheterodyne Receiver with Loop Antenna
TUBES (SIX)	Types, 12AT7 FM Conv., 12BE6 AM Conv., 12SK7 IF Amp., 12SQ7GT Det.-AVC-AF, 35L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	110-120 Volts AC-DC RATING .23 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540-1630KC FM 88-108MC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and chassis.

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.2 MFD.	High side to rear stator of tuning cap. Low side to chassis.	455KC	AM (Clockwise)	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD. to reduce hum modulation.
2	200MMFD	High side to ant. lead. Low side to ground lead.	1630KC	"	"	"	A5	Adjust for maximum output.
3	200MMFD	"	1400KC	"	Tune for maximum output.	"	A6	" " " "

FM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
4	300Ω carbon res.	High side to #1 antenna terminal Low side to #3 antenna terminal Jumper wire removed.	27.75MC (unmodulated)	FM (Counter-clockwise)	Tuning cap. fully open.	Across voice coil	A7	Adjust for maximum output.
5	300Ω carbon res.	"	108MC	FM	"	"	A8	Open A8 to minimum capacity. Tighten to first peak and adjust for maximum output.
6	300Ω carbon res.	"	105MC	"	Tune for maximum capacity	"	A9	Rock tuning cap. and adjust for maximum output.

HOWARD W. SAMS & CO., INC. Indianapolis, Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		SENTINEL PART No.	STANDARD REPLACEMENT		
1	FM Converter	12AT7	12AT7		
2	AM Converter	12BE6	12BE6	7CH	
3	IF Amp.	12SK7	12SK7	8N	
4	Det.-AVC-AF	12SQ7GT	12SQ7GT	8Q	
5	Power Output	35L6GT	35L6GT	7AC	
6	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

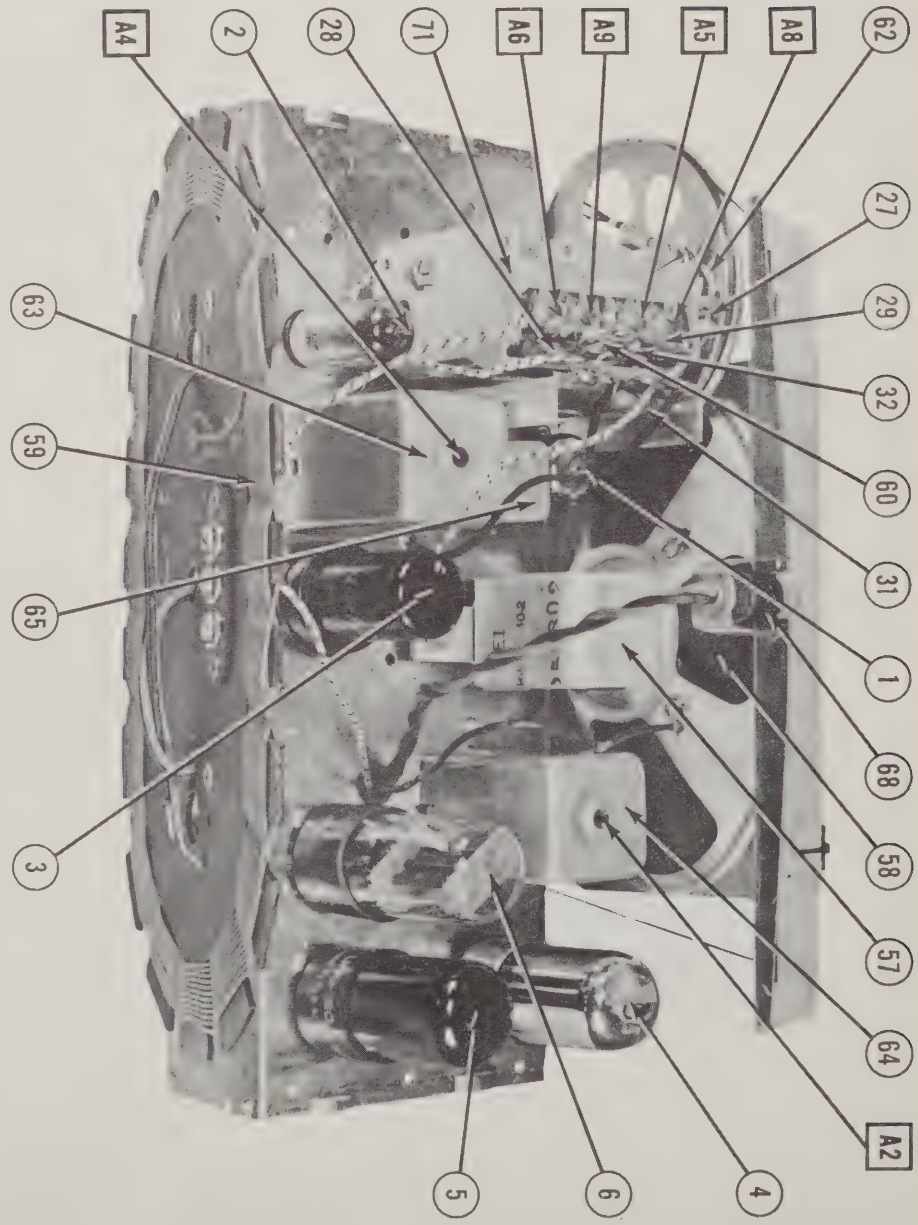
ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	SENTINEL PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
7A	50	150	25E26	PRSA150-50-50	EZ5515	DSB-2x50-150	TA-505	Filter-Yellow
B	50	150						" -Red
C	40	150		PRS[illegible]-40	BR4015	M-40-150	UT-401	" -Blue
8	20	25	25E3	PRS25-25	BR252A	M-25-25	TA-25	Output Cathode Bypass
9	10	25	25E8	PRS25-10	BR102A	M-10-25	TA-10	Stabilizing
10	.05	400	23E416	484-05	DT4S5	ST-4-05	TC-15	Line Filter
11	.01	400	23E411	484-01	DT4S1	ST-4-01	TC-11	Output Plate Bypass
12	.005	600	23E408	684-005	DT6D5	ST-6-005	TC-25	Audio Coupling
13	.005	600	23E408	684-005	DT6D5	ST-6-005	TC-25	" "
14	.05	200	23E216	484-05	DT4S5	ST-4-05	TC-15	AVC Filter
15	.02	400	23E413	484-02	DT4S2	ST-4-02	TC-12	Audio Coupling
16	1000	350	23E2012	1468-001	1W5D1	MO.3-21	1FM-21	RF Bypass Pwr. Supply-Cer.
17	100	500	23E39	1468-0001	5W5T1	MO.5-31	1FM-31	Fil. Bypass
18	100	500	23E39	1468-0001	5W5T1	MO.5-31	1FM-31	RF Coupling
19	5000	350	23E2012-4	1467-005	1D5D5	MW.5-25	TC-25	RF Bypass Pwr. Supply-Cer.
20	100	500	23E39	1468-0001	5W5T1	MO.5-31	1FM-31	RF Bypass
21	100	500	23E39	1468-0001	5W5T1	MO.5-31	1FM-31	AF Plate Bypass
22	250	500	23E42	1468-00025	5W5T25	MO.5-325	1FM-325	Diode Filter
23	50	500	23E37	1469-00005	5R5Q5	MOS.5-45	MS-45	Osc. Grid Cap.-Silver
24	1000	350	23E2012	1468-001	1W5D1	MO.5-21	1FM-21	De-emphasis-Cer.
25	500	300	23E45	1468-0005	5W5T5	MO.5-35	1FM-35	FM Osc. Plate Bypass
26	20	500	23E22		5W5Q2	MOS.5-42	MS-42	FM Osc. Grid Cap.-Cer.
27	20	500	23E22		5R5Q2	MOS.5-42	MS-42	Fixed Trimmer-Cer.
28	500	300	2345	1468-0005	5W5T5	MO.5-35	1FM-35	RF Bypass
29	2	500	23E21					FM Osc. Coupling-Cer.
30	2500	300	23E53	1467-0025	1W5D25	MW.5-225	1FM-23	Quench Network
31	1000	350	23E2012	1468-001	1W5D1	MO.5-21	1FM-21	Ant. Isolation-Cer.
32	2	500	23E21					RF Coupling-Cer.
33	30	500	23E23		5R5Q3	MOS.5-43	MS-43	Feedback-Cer.
34	30	500	23E23		5R5Q3	MOS.5-43	MS-43	" "
35	5000	350	23E2012-4	1467-005	1D5D5	MW.5-25	1FM-25	RF Bypass-Cer.
36	1000	350	23E2012	1468-001	1W5D1	MO.5-21	1FM-21	Conv. Screen Bypass-Cer.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	SENTINEL PART No.	IRC PART No.	CLAROSTAT PART No.	
37A	500KΩ	½	28E7	D13-133#	AM-60-Z#	Volume Control
B	Shaft		Not Req.	E*	KSS-3*	Attach to 37A per instructions
C	Switch		" "	41	SW-A	" " " " "

#Install a 47KΩ resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control. (Controls viewed from shaft side, terminals down.)
*Wrap scotch tape around shaft adjacent to lock ring for dial cord surface.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	SENTINEL PART No.	IRC PART No.	
39	.5MΩ	½	27E504	BTS-.5K	Red-Red-Or. Oscillator Grid
40	20 Meg.	½	27E206	BTS-22 Meg.	Red-Blk.-Blue AVC Network
40	3.3 Meg.	½	27E335	BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
41	22KΩ	½	27E223	BTS-22K	Red-Red-Or. FM Oscillator Grid
42	1000Ω	½	27E102	BTS-1000	Br.-Blk.-Red FM Oscillator Plate Load
43	1000Ω	½	27E102	BTS-1000	Br.-Blk.-Red FM Decoupling
44	22KΩ	½	27E223	BTS-22K	Red-Red-Or. Conv. Cathode
45	100KΩ	½	27E104	BTS-100K	Br.-Blk.-Yl. De-emphasis
46	1500Ω	½	27E152	BTS-1500	Br.-Grn.-Red Quench Network
47	150KΩ	½	27E154	BTS-150K	Br.-Grn.-Yl. Voltage Dropping
48	3.3 Meg.	½	27E335	BTS-3.3 Meg.	Or.-Or.-Grn. AF Grid
49	470KΩ	½	27E474	BTS-470K	Yl.-Vi.-Yl. AF Plate Load
50	470KΩ	½	27E474	BTS-470K	Yl.-Vi.-Yl. Output Grid
51	150Ω	½	27E151	BW-½-150	Br.-Grn.-Br. Output Cathode
52	1000Ω	1	27E102-3	BTA-1000	Br.-Blk.-Red Filter
53	100Ω	½	27E101-2	BW-½-100	Br.-Blk.-Br. Pilot Light Shunt
54	47Ω	½	27E470-2	BW-½-47	Yl.-Vi.-Blk. Rectifier Ballast
55	68Ω	½	27E680	BW-½-68	Blue-Gray-Blk. Grounding Resistor

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		SENTINEL PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
56	4500Ω	3.6Ω	250Ω	.9Ω	22E8	A-3876‡	T-2540‡	A-2900‡	‡Drill one new mounting hole.

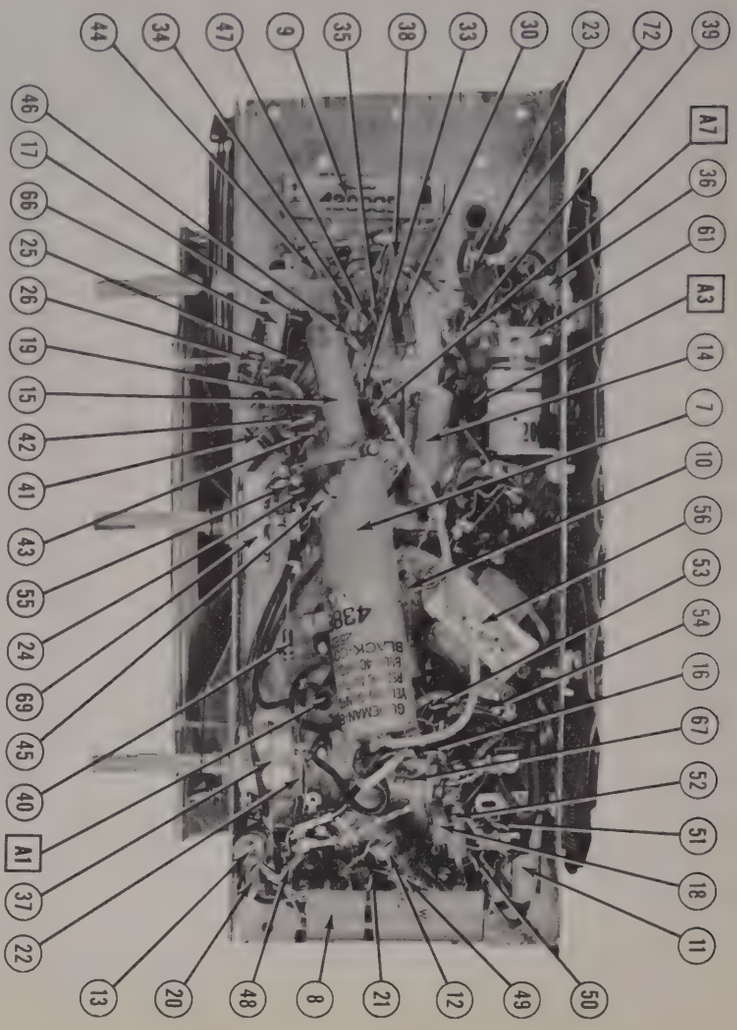
SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			SENTINEL PART No.	JENSEN PART No.	QUAM PART No.	
57	FIELD	VC IMP.	1E1		46A1†	†Fabricate new mounting bracket.
	PM	3.6Ω				
	CONE DIA.	VC DIA.				
58	4"x6"	1/2"				

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	SENTINEL PART No.	MEISSNER PART No.	
59	Loop Ant.	.1Ω	.7Ω	20E315		
60	FM Ant.Coil		0Ω	2E71		
61	BC Osc. Coil	.5Ω	6.8Ω	20E312	14-1060	
62	FM " "		0Ω	2E70		
63A	Input IF	9.5Ω	9.5Ω	20E261	16-5740	
B	" "			20E307	16-5740	Alternate
64A	Output IF	9.5Ω	9.5Ω	20E261-2	16-5742	
B	" "			20E307-2	16-5742	"
65	FM IF Trans	.3Ω	2.3Ω	20E313		
66	FM Choke		1Ω	2E68		
67	Line Choke	0Ω	0Ω	2E71		
72	RF Choke		0Ω			

CHASSIS—BOTTOM VIEW



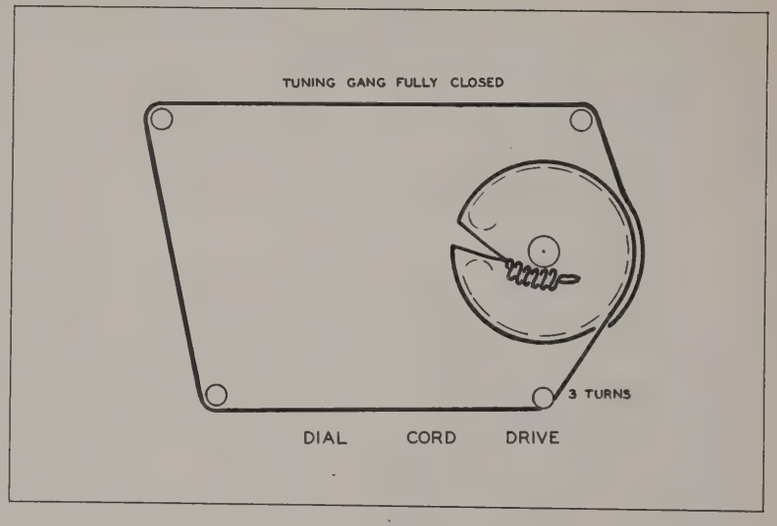
PARTS LIST AND DESCRIPTIONS (Continued)

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					SENTINEL PART No.		
68	Bayonet	6-8	0.15	Brown	40E1		Type 47

MISCELLANEOUS

ITEM No.	PART NAME	SENTINEL PART No.	NOTES
69	Switch	29E8	Band
70	Line Cord		Resistor
71	Tuning Gang	24E38	(32-553MMF, 40-213MMF)
	Cabinet	7E46-1	Walnut Plastic
	"	7E46-2	Ivory Plastic
	Dial Scale	36E38	Glass
	Dial Pointer	35E8-5	
	Knob	37E27-11	Walnut
	"	37E27-36	Ivory



VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.

VOLTAGE READINGS

	Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
‡	1	12AT7	97VDC	27VDC	45VDC	12VAC	0V.	95VDC	-3VDC§	0V.	6.1VAC
	2	12BE6	-8VDC§	0V.	26VAC	39VAC	92VDC	92VDC	-.5VDC	-	-
	3	12SK7	0V.	39VAC	0V.	-.5VDC	0V.	92VDC	50VAC	92VDC	-
	4	12SQ7GT	0V.	-.5VDC	0V.	-.7VDC	-.7VDC	50VDC	26VAC	12VAC	-
	5	35L6GT	0V.	50VAC	107VDC	92VDC	0V.	0V.	85VAC	5.6VDC	-
	6	35Z5GT	0V.	117VAC	113VAC	92VDC	110VAC	0V.	85VAC	115VDC	-

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

	Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
‡	1	12AT7	52KΩ	200KΩ	23KΩ	11Ω	0Ω	53KΩ	22KΩ	1Ω	6Ω
	2	12BE6	22KΩ	.5Ω	23Ω	36Ω	50KΩ	51KΩ	3.8 Meg.	-	-
	3	12SK7	0Ω	36Ω	0Ω	3.8 Meg	0Ω	50KΩ	47Ω	50KΩ	-
	4	12SQ7GT	0Ω	3.3 Meg.	0Ω	500KΩ	500KΩ	520KΩ	23Ω	11Ω	-
	5	35L6GT	0Ω	47Ω	50KΩ	50KΩ	470KΩ	INF.	80Ω	150Ω	-
	6	35Z5GT	INF.	110Ω	105Ω	50KΩ	105Ω	INF.	80Ω	50KΩ	-

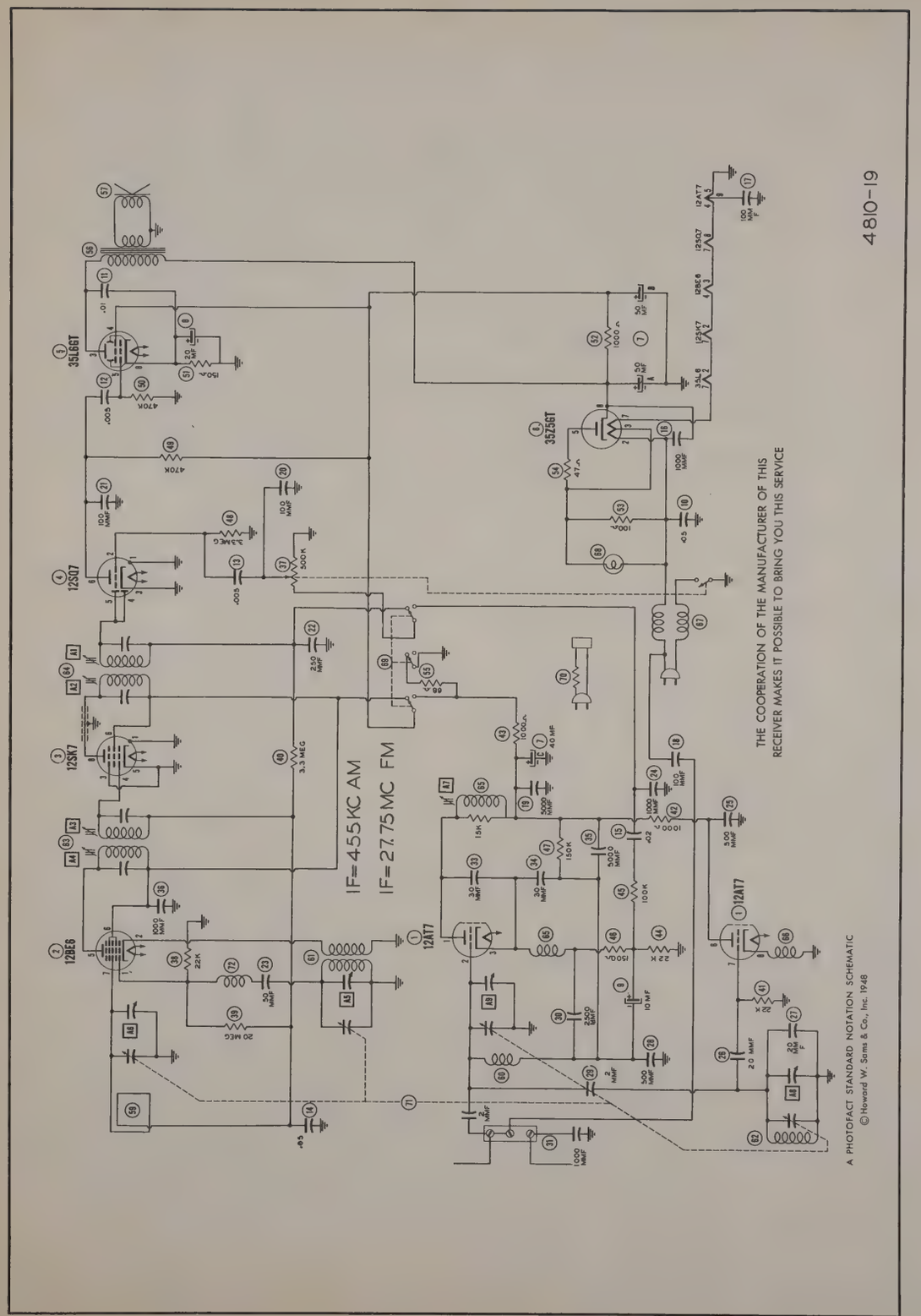
‡ VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

STAGE GAIN MEASUREMENTS			
ANTENNA TO CONVERTER GRID	50X		600KC
CONVERTER GAIN	14X	IN	600KC
		OUT	455KC
INPUT IF TRANSFORMER	.5X		455KC
IF TUBE	85X		455KC
OUTPUT IF TRANSFORMER	.9X		455KC
AUDIO	30X		400 ∿
OUTPUT	25X		400 ∿

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation; such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by connecting negative (-) 3 volts to the AVC line.



SETCHELL-CARLSON MODEL 447
BATTERY-LINE OPERATED

SETCHELL-CARLSON MODEL 447
BATTERY-LINE OPERATED

SETCHELL-CARLSON MODEL 447

TRADE NAME	Setchell-Carlson, Model 447
MANUFACTURER	Setchell-Carlson Inc., 2233 University Ave., St. Paul 4, Minn.
TYPE SET	Three Power Operated Portable Superheterodyne Receiver with Loop Antenna
TUBES (FIVE)	Types, 1T4 RF Amp., 1R5 Converter, 1T4 IF Amp., 1S5 Det.-AVC-AF, 3V4 Power Output.
POWER SUPPLY RATING	110-120 Volts AC-DC or 9 Volts "A" Supply and 90 Volts "B" Supply .16 Amp. @ 117 Volts AC or 69MA @ 9 Volts and 12.5MA @ 90 Volts DC
TUNING RANGE--BROADCAST	535-1700KC

ALIGNMENT INSTRUCTIONS--READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low freq. end of dial.

Use battery power when available. If AC power is used, use an isolation transformer when available. If not, connect a .1 MFD capacitor in series with low side of the signal generator and B-.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.01 MFD	High side to Pin 6 (grid) of 1R5. Low side to chassis.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If AC power is used without an isolation transformer reduce dummy ant. to 200MMFD to reduce hum modulation.
2		Loop	1400KC	1400KC	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	"	Tune for maximum output.	"	A6,A7	Adjust for maximum output.

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

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PARTS LIST AND DESCRIPTIONS

SETCHELL-CARLSON
MODEL 447

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: SETCHELL-CARLSON PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	1T4	1T4	6AR	
2	Converter	1R5	1R5	7AT	
3	IF Amp.	1T4	1T4	6AR	
4	Det.-AVC-AF	1S5	1S5	6AU	
5	Power Output	3V4	3V4	6BX	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: SETCHELL-CARL. PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
6A	50	150		AF1010D	UP5515	DY-2x50-150	EL-25	▲ Filter
B	50	150						■ "
7A	50	150		AF1010D	UP5515	DY-2x50-150	EL-25	■ Filament Bypass
B	50	150						▲ " "
8A	50	150		AF1010D	UP5515	DY-2x50-150	EL-25	■ Filter
B	50	150						▲ Filament Bypass
9	.05	400		484-05	DT4S5	ST-4-05	TC-15	Line Filter
10	.006	400		484-006	DT6D6	ST-6-006	TC-26	Output Plate Bypass
11	.004	500		684-004	DT6D4	ST-6-004	TC-24	Audio Coupling
12	.05	200		484-05	DT2S5	ST-4-05	TC-15	AF Screen Bypass
13	.004	500		684-004	DT6D4	ST-6-004	TC-24	Audio Coupling
14	.1	200		484-.1	DT2P1	ST-2-1	TC-1	RF Bypass
15	.05	200		484-05	DT2S5	ST-4-05	TC-15	AVC Filter
16	.05	200		484-05	DT2S5	ST-4-05	TC-15	" "
17	100	300		1468-0001	5W5T1	MO.5-31	1FM-31	AF Plate Bypass-Cer.
18	100	300		1468-0001	5W5T1	MO.5-31	1FM-31	Diode RF Filter-Cer.
19	100	300		1468-0001	5W5T1	MO.5-31	1FM-31	Osc. Grid Cap.-Cer.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SETCHELL-CARLSON PART No.	IRC PART No.	CLAROSTAT PART No	INSTALLATION NOTES
20A	500KΩ	½		D13-133†	M-60-Z†	Volume Control
B	Shaft			A	Not Req.	Attach to 20A per instructions
C	Switch			42	SW-A2	" " " " "

†Use original nut on replacement control

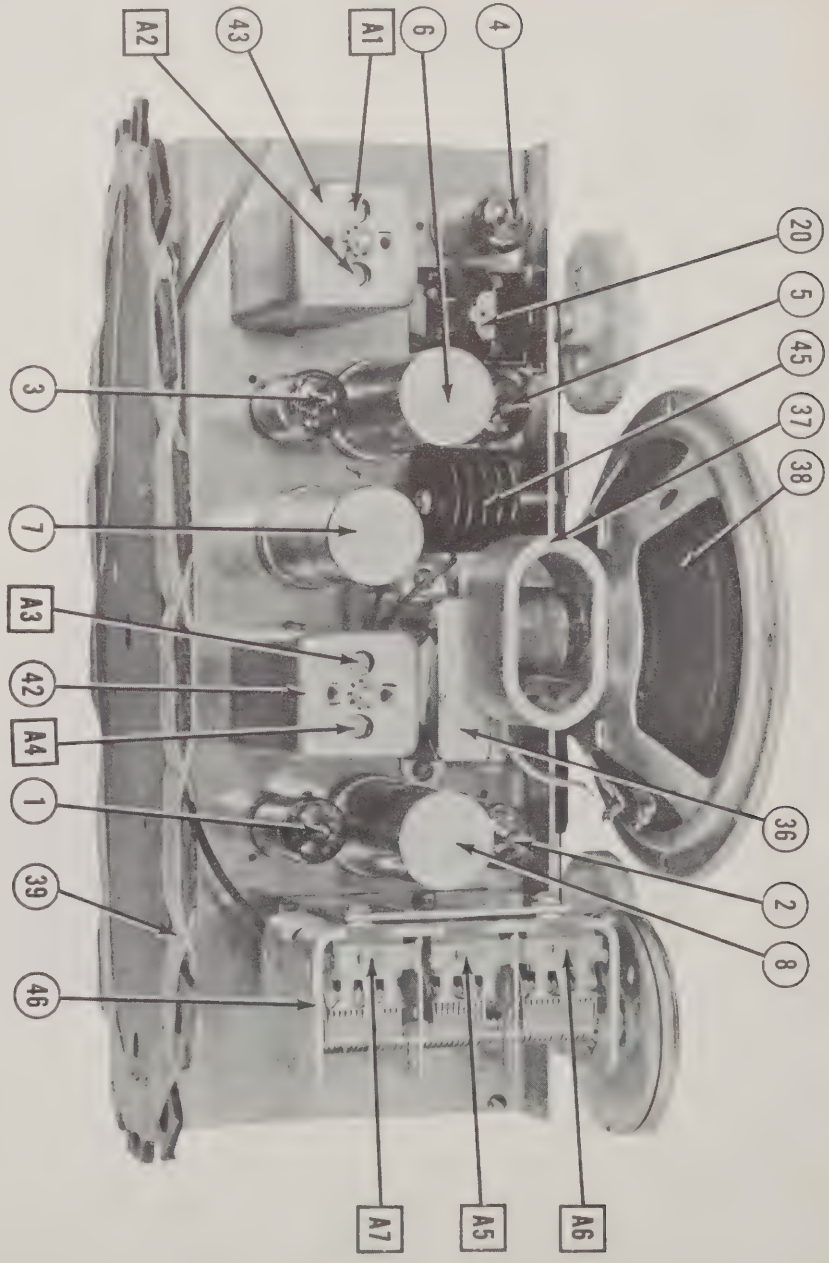
RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SETCHELL-CARLSON PART No.	IRC PART No.	IDENTIFICATION CODES
21	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. AVC Network
22	75KΩ	½		BTS-82K	Gray-Red-Or. Oscillator Grid
23	5000Ω	½		BTS-4700	Grn.-Blk.-Red Decoupling
24	2.2 Meg.	½		BTS-2.2 Meg.	Red-Red-Grn. AVC Network
25	5.1 Meg.	½		BTS-4.7 Meg.	Grn.-Br.-Grn. AF Grid
26	5.1 Meg.	½		BTS-4.7 Meg.	Grn.-Br.-Grn. AF Screen
27	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. AF Plate Load
28	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. Output Grid
29	3000Ω	½		BTS-2700	Or.-Blk.-Red Filter
30	150Ω	½		BW-½-150	Br.-Grn.-Br. Filter
31	2000Ω	10		AB-2000	Filament Dropping
32	100Ω	5		AB-100	Surge Limiter
33	24KΩ	½		BTS-24K	Red-Yl.-Or. Filament String
34	500Ω	½		BTS-470	Grn.-Blk.-Br. " "
35	1200Ω	½		BTS-1200	Br.-Red-Red " "

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: SETCHELL-CARLSON PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.	INSTALLATION NOTES
36	7000Ω	3.3Ω	350Ω	.2Ω	0-447	A-3878†	T22S47†	A-2931†	†Drill one new mounting hole.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: SETCHELL-CARLSON PART No.	REPLACEMENT DATA: JENSEN PART No.	REPLACEMENT DATA: QUAM PART No.	INSTALLATION NOTES
	FIELD	VC IMP.		ST-105*		
37	PM	3.3Ω		Mod. PX-5	5A15*	*Fabricate new mounting bracket.
	CONE DIA.	VC DIA.				
38	4-3/4"	1/2"				

R F COILS

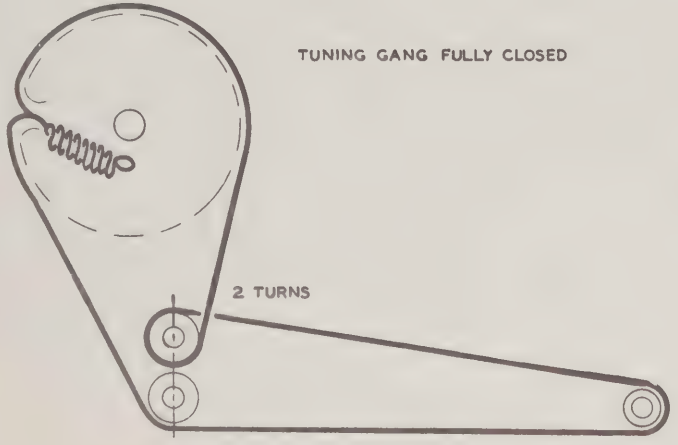
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: SETCHELL-CARLSON PART No.	REPLACEMENT DATA: MEISSNER PART No.
39	Loop Ant.		3Ω	427-19	
40	RF Coil	102Ω	4.7Ω	427-5	
41	Osc. Coil	1.3Ω	4.6Ω		14-1060
42	Input IF	18Ω	18Ω	621-305	16-6658
43	Output IF	18Ω	18Ω	622-305	16-6660

BATTERIES

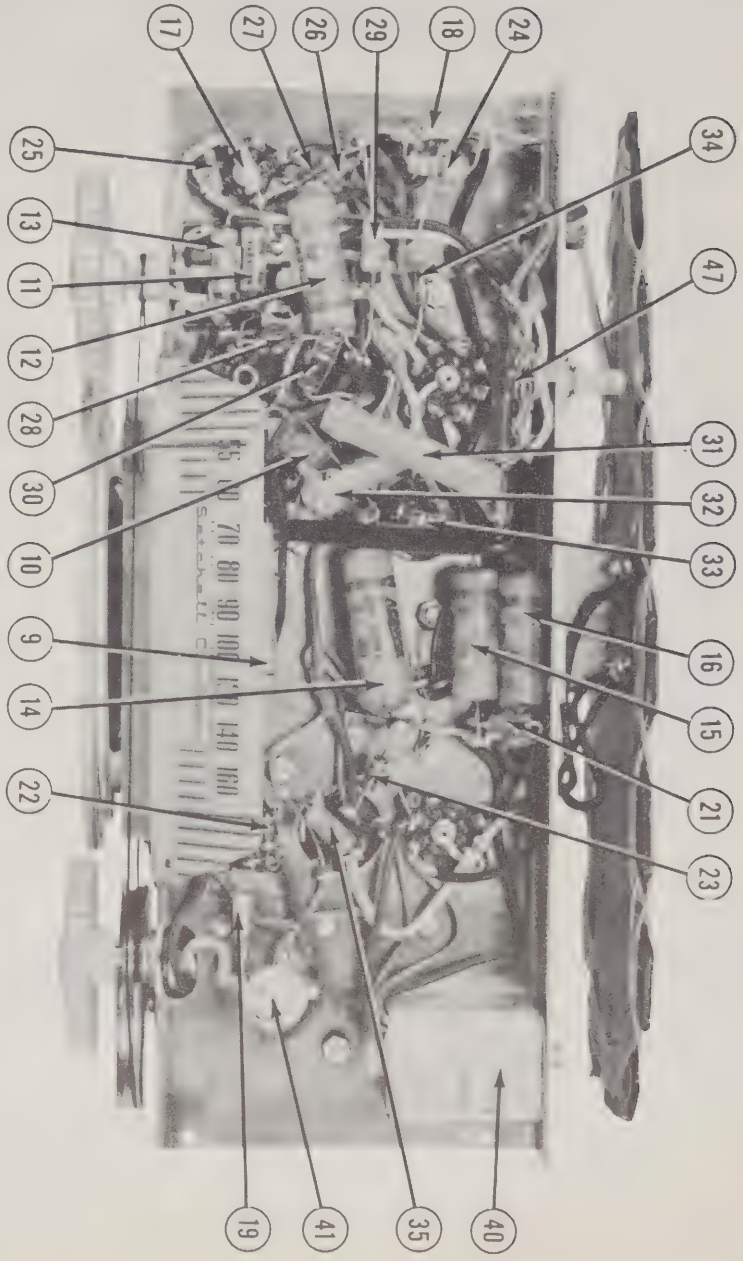
ITEM No.	VOLTAGE	SETCHELL-CARL. PART No.	REPLACEMENT DATA: EVEREADY "A"	EVEREADY "B"	EVEREADY "A-B"	BURGESS "A"	BURGESS "B"	BURGESS "A-B"	INSTALLATION NOTES
44	9V "A" 90V "B"				#753			6A60	

MISCELLANEOUS

ITEM No.	PART NAME	SETCHELL-CARLSON PART No.	NOTES
45	Rectifier		Selenium
46	3 Gang Var. Cap.		(27-470MMF, 27-470MMF, 31-194MMF)
47	Switch		AC/DC-Batt.

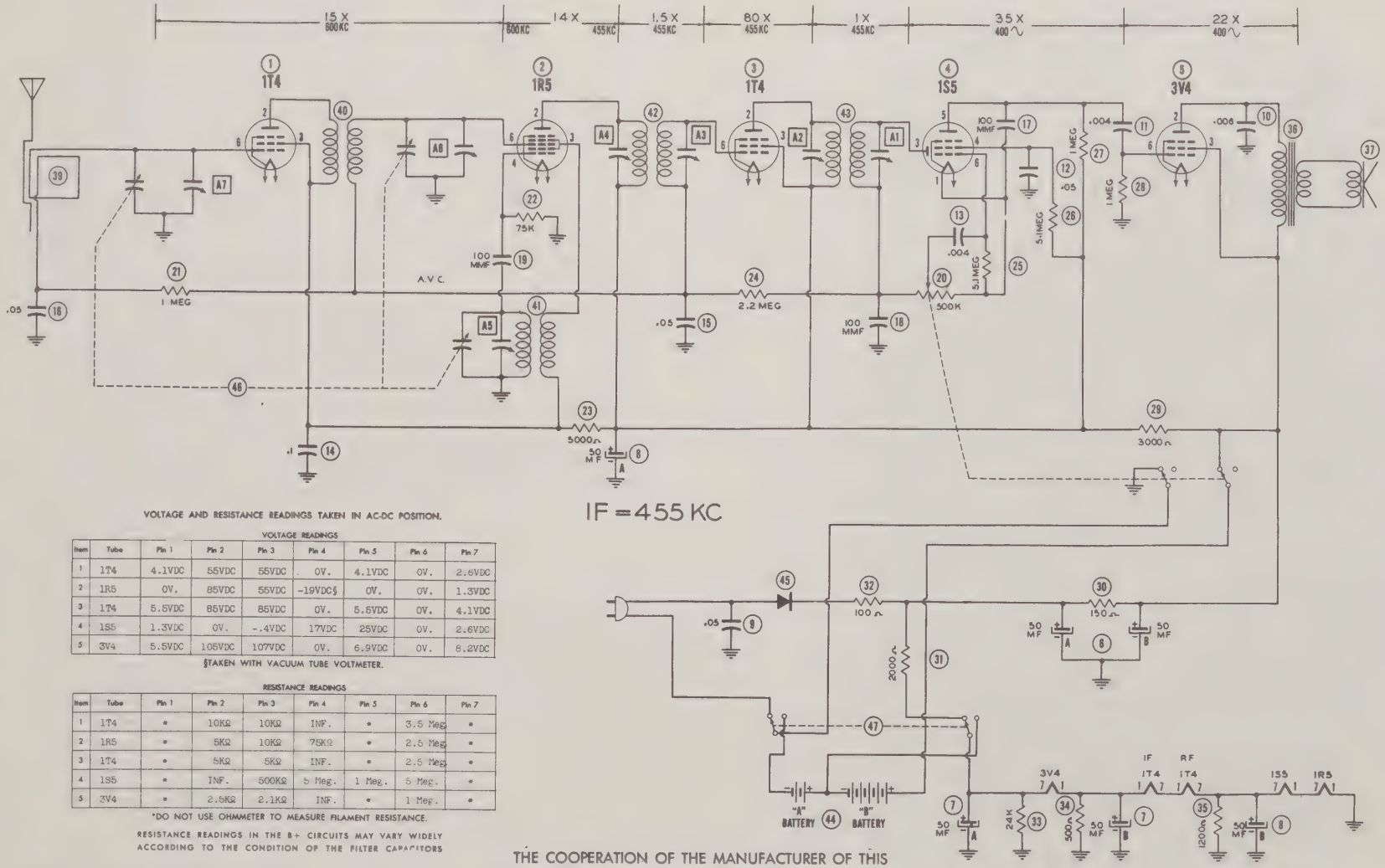


CHASSIS—BOTTOM VIEW



SETCHELL-CARLSON MODEL 447

SETCHELL-CARLSON MODEL 447



VOLTAGE AND RESISTANCE READINGS TAKEN IN AC-DC POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1T4	4.1VDC	55VDC	55VDC	0V.	4.1VDC	0V.	2.6VDC
2	1R5	0V.	85VDC	55VDC	-19VDC§	0V.	0V.	1.3VDC
3	1T4	5.5VDC	85VDC	85VDC	0V.	5.5VDC	0V.	4.1VDC
4	1S5	1.3VDC	0V.	-.4VDC	17VDC	25VDC	0V.	2.6VDC
5	3V4	5.5VDC	105VDC	107VDC	0V.	6.9VDC	0V.	8.2VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1T4	*	10KΩ	10KΩ	INF.	*	3.5 Meg.	*
2	1R5	*	5KΩ	10KΩ	75KΩ	*	2.5 Meg.	*
3	1T4	*	5KΩ	5KΩ	INF.	*	2.5 Meg.	*
4	1S5	*	INF.	500KΩ	5 Meg.	1 Meg.	5 Meg.	*
5	3V4	*	2.5KΩ	2.1KΩ	INF.	*	1 Meg.	*

*DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

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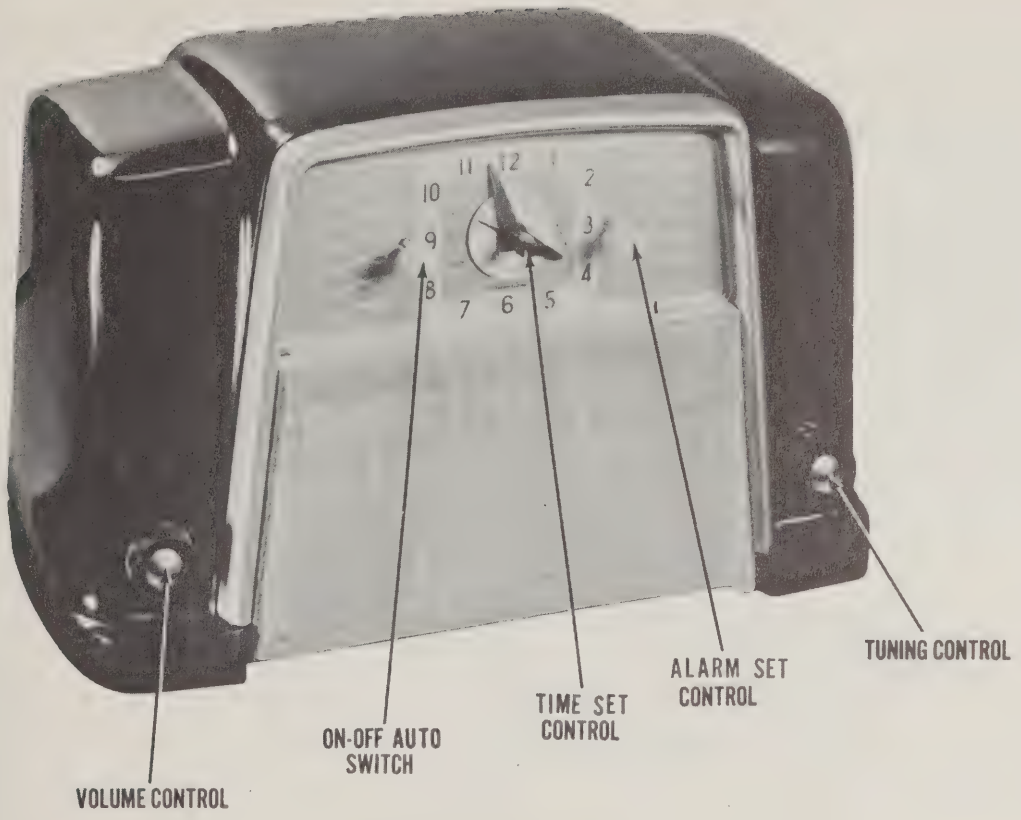
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

4810-20

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by shorting AVC to chassis Pin 1 of 1S5.

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measurements at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - Volume control at maximum, no signal applied for voltage measurements.

SILVERTONE MODEL
8010 (Ch. 132.840)



SILVERTONE MODEL
8010 (Ch. 132.840)

SILVERTONE MODEL 8010

TRADE NAME	Silvertone, Model 8010 (Ch. 132.840)
SUPPLIER	Sears, Roebuck & Co., 925 S. Homan St., Chicago, Ill.
TYPE SET	AC Operated Superheterodyne Receiver with Electric Clock
TUBES (FIVE)	Types, 12SA7GT Converter, 12SK7GT IF Amp., 12SQ7GT Det.-AVC-AF, 50L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	105-125 Volts AC
TUNING RANGE—BROADCAST	540-1600KC RATING .27 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low freq. end of dial.

Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.05 MFD.	High side to Pin 8 (grid) of 12SA7 (1). Low side to B-.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD. to reduce hum modulation.
2	50MMFD.	High side to ext. antenna lead. Low side to B-.	1400KC	1400KC	"	A5	Adjust for maximum output.
3	50MMFD.	"	"	Tune for maximum output.	"	A6	" " " "
4	50MMFD.	"	600KC	600KC	"	-	Check calibration.

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PARTS LIST AND DESCRIPTIONS

SILVERTONE MODEL [illegible]

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: SILVERTONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	12SA7GT	12SA7GT	8AD	
2	IF Amp.	12SK7GT	12SK7GT	8N	
3	Det.-AVC-AF	12SQ7GT	12SQ7GT	8Q	
4	Power Output	50L6GT	50L6GT	7AC	
5	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: SILVERTONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
6A	50	150	N21253	PRSA150/30-50	BRD3515	DSB-5030-150	TA-530	Filter-Red * -Blue
B	30	150						
7	.05	400		484-05	DT4S5	ST-4-05	TC-15	Line Filter
8	.02	400		484-02	DT4S2	ST-4-02	TC-12	Output Plate Bypass
9	.005	400		484-005	DT6D5	ST-6-005	TC-25	Audio Coupling
10	.002	600		684-002	DT6D2	ST-6-002	TC-22	AF Plate Bypass
11	.002	600		684-002	DT6D2	ST-6-002	TC-22	Audio Coupling
12	.05	200		484-05	DT2S5	ST-4-05	TC-15	AVC Filter
13	.005	400		484-005	DT6D5	ST-6-005	TC-25	Ext. Ant. Isolation
14	.1	400		484-.1	DT4P1	ST-4-1	TC-1	Line Isolation
15	250	500		1468-00025	5W5T25	MO.5-325	1FM-325	Diode RF Filter
16	50	500		1468-00005	5W5Q5	MO.5-45	1FM-45	Osc. Grid Cap.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SILVERTONE PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
17	1 Meg.	½	N21304			Volume Control

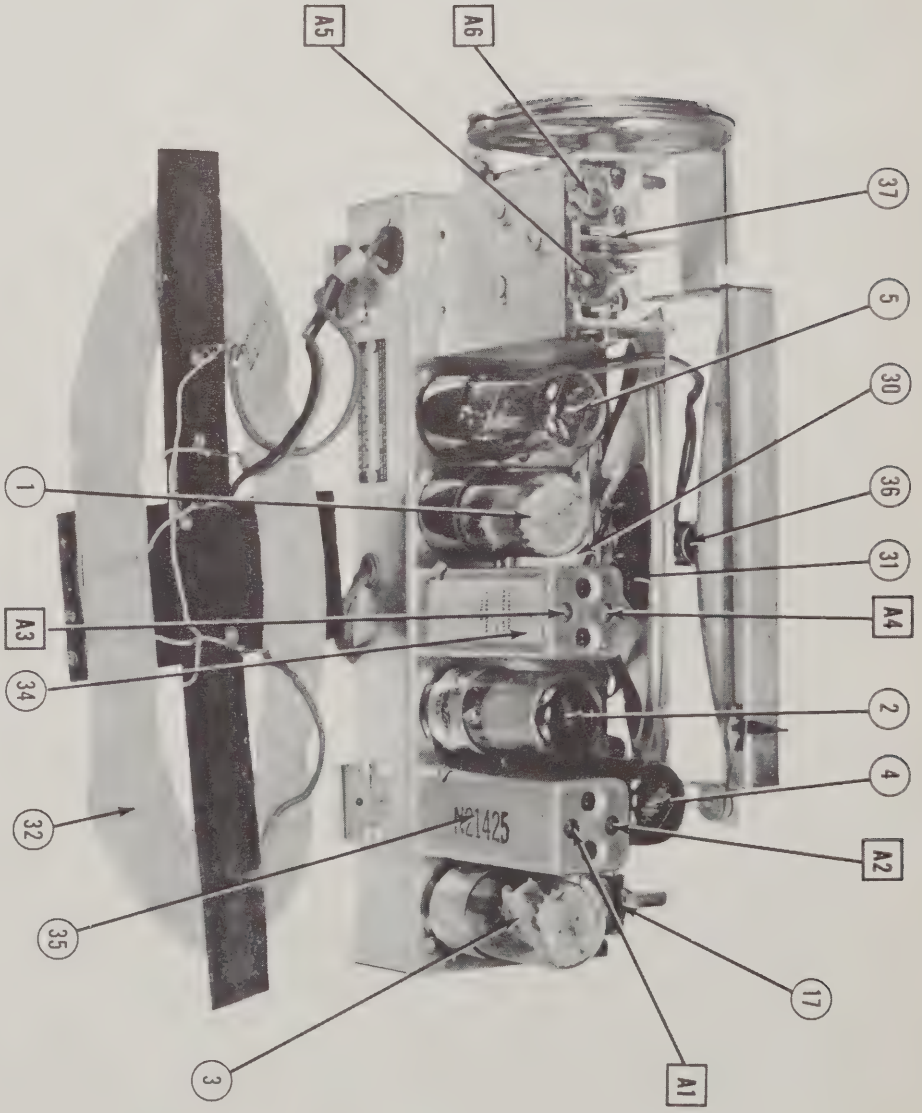
RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SILVERTONE PART No.	IRC PART No.	IDENTIFICATION CODES
18	33 KΩ	¼		BTS-330K	Or.-Or.-Yl. Line Isolation
19	22KΩ	¼		BTS-22K	Red-Red-Or. Oscillator Grid
20	10 Meg.	¼		BTS-10 Meg.	Br.-Blk.-Blue AVC Network
21	2.2 Meg.	¼		BTS-2.2 Meg.	Red-Red-Grn. AVC Network
22	15 Meg.	¼		BTS-15 Meg.	Br.-Grn.-Blue AF Grid
23	470KΩ	¼		BTS-470K	Yl.-Vi.-Yl. AF Plate Load
24	470KΩ	¼		BTS-470K	Yl.-Vi.-Yl. Output Grid
25	150Ω	¼		BW-½-150	Br.-Grn.-Br. Output Cathode
26	22Ω	¼		BW-½-22	Red-Red-Blk. Surge Limiter
27	330Ω	¼		BW-½-330	Or.-Or.-Br. Pilot Light Shunt

FILTER CHOKE

ITEM NO.	RATINGS: TOTAL DIRECT CURRENT	RATINGS: D. C. RESISTANCE	RATINGS: INDUCTANCE @ CURRENT 1000 ∿	REPLACEMENT DATA: SILVERTONE PART NO.	STANCOR PART NO.	THORDARSON PART NO.	MERIT PART No.	INSTALLATION NOTES
28	24MA	400Ω	7 Henries	N21265	C-1706†	T20C52†	C-2975†	†Drill one new mounting hole.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		SILVERTONE PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
29	2250Ω	3.4Ω	100Ω	.4Ω	N21247	A-3876	T22S45	A-2028	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			SILVERTONE PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	VC IMP.				
30	PM	3.4Ω	N21302		46A15*	*Drill and tap magnet frame.
	CONE DIA.	VC DIA.				
31	4x6"	1/2"				

R F COILS

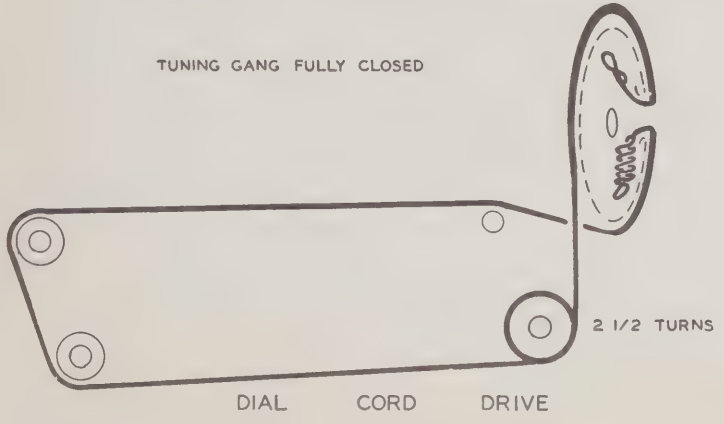
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	SILVERTONE PART No.	MEISSNER PART No.	
32	Ant. Loop	0Ω	.8Ω	N-21297		
33	BC Osc.Coil	.8Ω	5.7Ω	N-19354		
34	Input IF	21.2Ω	20.8Ω	N-21424	16-6658	
35	Output IF	21.1Ω	21.0Ω	N-21425	16-6660	

DIAL LIGHT

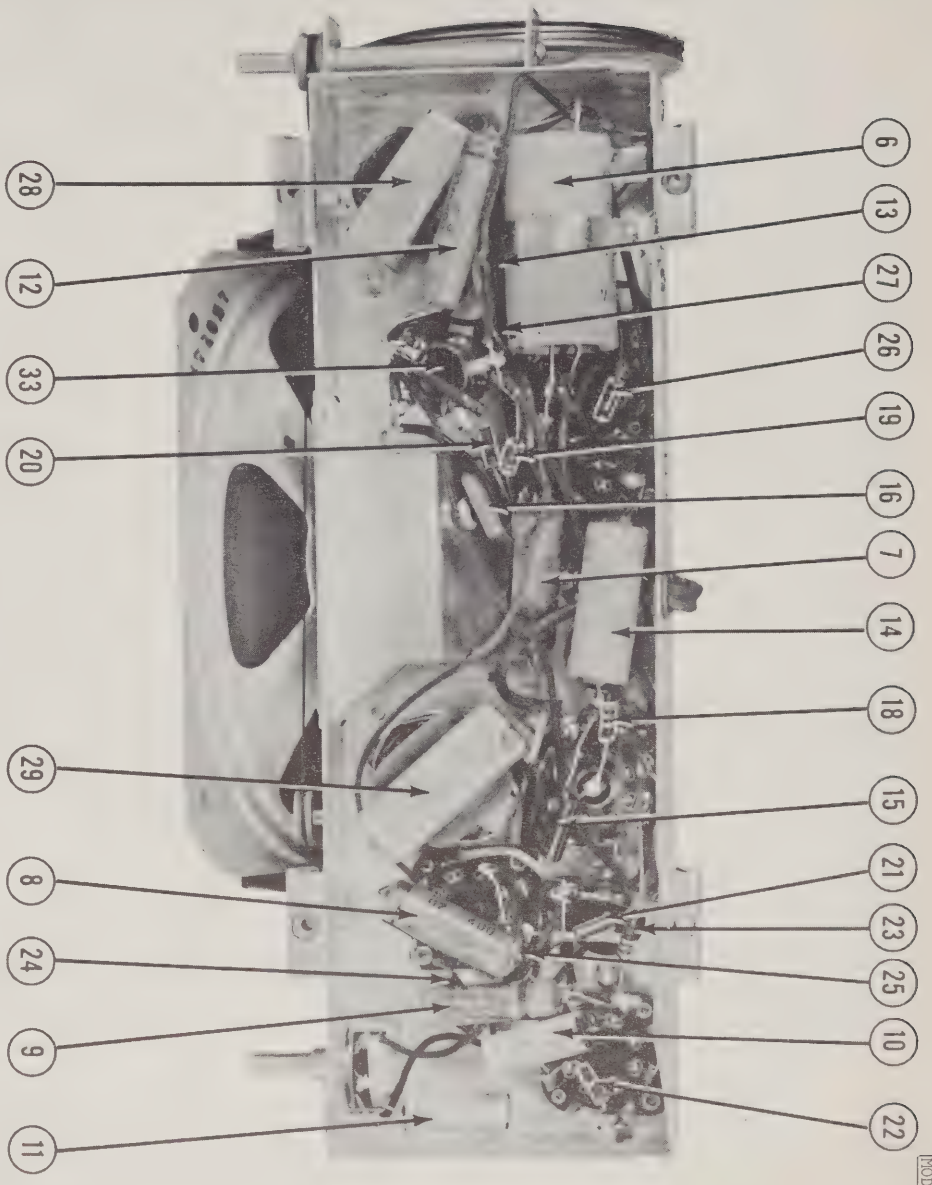
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					SILVERTONE PART No.		
36	Bayonet	6-8	0.15	Brown			Type 47

MISCELLANEOUS

ITEM No.	PART NAME	SILVERTONE PART No.	NOTES
37	2 Gang Var. Cap.	N21305	(18-427MMF, 18-185MMF)
	Dial Scale	N21290	
	Dial Pointer	N21295	
	Knob	N21204-2	Volume or Tuning
	Cabinet	N21092	
	Clock	N21265	

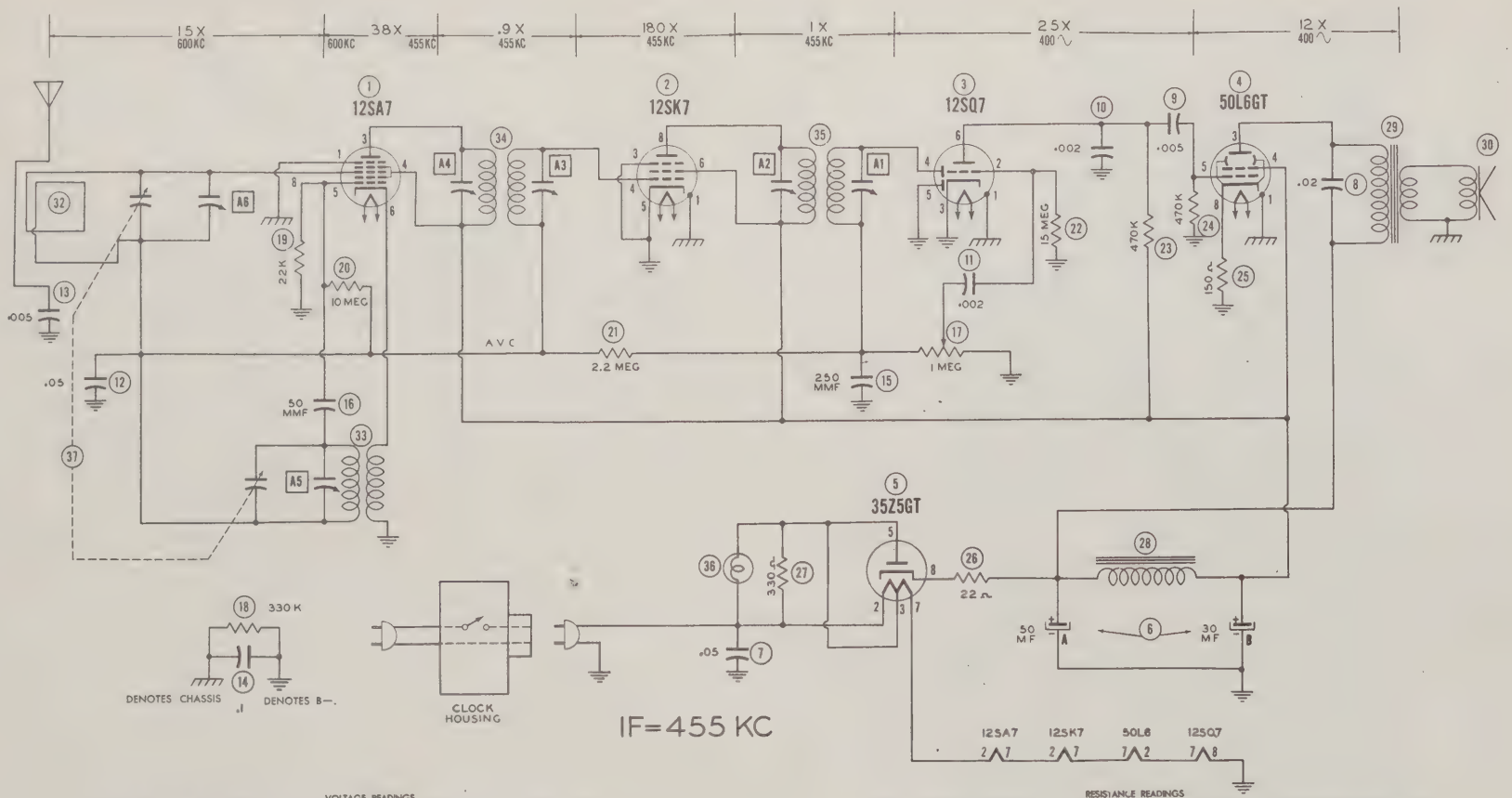


CHASSIS—BOTTOM VIEW



SILVERTONE MODEL 8010

DATE 5/48-#4810-21 SET #40-FOLDER #21



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7	0V.	85VAC	97VDC	97VDC	-11VDC§	0V.	72VAC	-.5VDC
2	12SK7	0V.	72VAC	0V.	-.5VDC	0V.	97VDC	60VAC	97VDC
3	12SQ7	0V.	-.1VDC	0V.	-.7VDC	0V.	62VDC	12VAC	0V.
4	50L6GT	0V.	1cVAC	10§VDC	97VDC	0V.	107VDC	60VAC	6.5VDC
5	35Z5GT	0V.	117VAC	111VAC	10§VDC	111VAC	0V.	85VAC	107VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7	330KΩ	85Ω	50KΩ	50KΩ	22KΩ	.8Ω	74Ω	3.2 Meg.
2	12SK7	330KΩ	74Ω	0Ω	3.2 Meg.	0Ω	50KΩ	60Ω	50KΩ
3	12SQ7	330KΩ	15 Meg.	0Ω	1 Meg.	0Ω	520KΩ	13Ω	0Ω
4	50L6GT	INF.	13Ω	50KΩ	50KΩ	470KΩ	50KΩ	60Ω	150Ω
5	35Z5GT	INF.	117Ω	111Ω	50KΩ	111Ω	INF.	85Ω	50KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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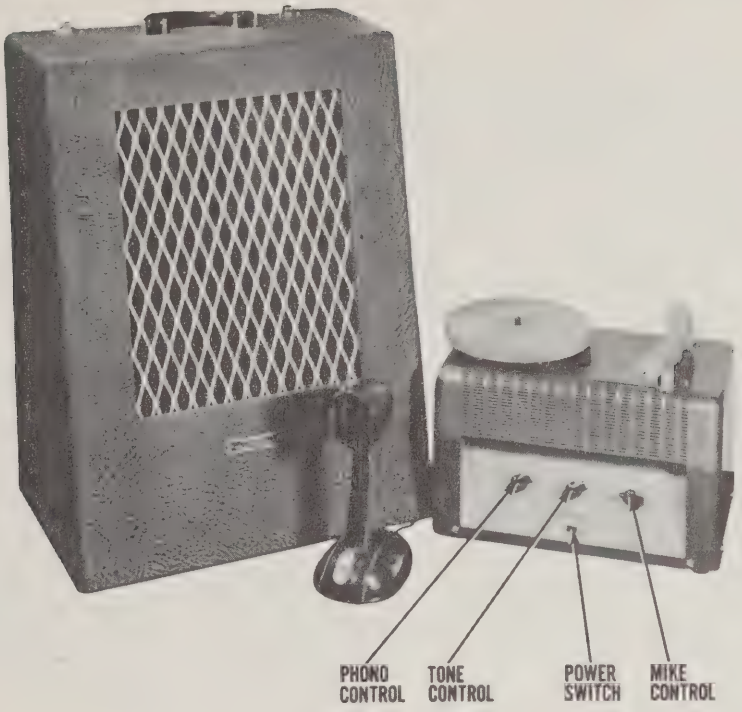
4810-21

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of + 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

STARK MODEL 410



STARK MODEL 410

STARK MODEL 410

TRADE NAME	Stark, Model 410
MANUFACTURER	Stark Sound Eng. Corp., 616 High St., Fort Wayne, Indiana
TYPE SET	AC Operated 2 Channel Amplifier with Phono Player
TUBES (FIVE)	Types, 7B4 Mic. Amp., 7F7 AF-Phase Inv.,(2) 7C5 Power Output, 7Z4 Rectifier.
POWER SUPPLY	105-125 Volts AC RATING .62 Amp. @ 117 Volts AC

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	7B4	0V.	225VDC	0V.	0V.	0V.	0V.	2VDC	6.6VAC
2	7F7	0V.	3VDC	255VDC	0V.	0V.	255VDC	3VDC	6.6VAC
3	7C5	0V.	310VDC	310VDC	0V.	0V.	0V.	20VDC	6.6VAC
4	7C5	0V.	310VDC	310VDC	0V.	310VDC	0V.	20VDC	6.6VAC
5	7Z4	0V.	0V.	320VAC	0V.	0V.	320VAC	335VDC	6.6VAC

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	7B4	0Ω	375KΩ	INF.	INF.	INF.	2 Meg.	4KΩ	.1Ω
2	7F7	0Ω	2.2KΩ	300KΩ	250KΩ	10KΩ	300KΩ	2.2KΩ	.1Ω
3	7C5	0Ω	200KΩ	200KΩ	INF.	INF.	480KΩ	250Ω	.1Ω
4	7C5	0Ω	200KΩ	200KΩ	INF.	200KΩ	470KΩ	250Ω	.1Ω
5	7Z4	0Ω	INF.	115Ω	INF.	INF.	110Ω	200KΩ	.1Ω

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - All controls at minimum, no signal applied for voltage measurements.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: STARK PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Mic. Amp.	7S4	7S4	5AC	
2	AF-Phase Inv.	7F7	7F7	8AC	
3	Power Output	7C5	7C5	6AA	
4	Power Output	7C5	7C5	6AA	
5	Rectifier	7Z4	7Z4	5AB	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: STARK PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
6A	40	450	IC3S-423-400	AF4444J*	UP222245*	DY-4x20-450*	EL-420*	▬ Filter
B	20	450						■ "
C	20	450						▲ Decoupling
7A	20	25	IC2S-22-25	AF44D	UP2215	DY-2x20-25	EL-221	▲ Cathode Bypass
B	20	25						■ " "
8	.1	400		484-.1	DT4P1	ST-4-1	TC-1	Line Filter
9	.006	600		6s4-006	DT6D6	ST-6-006	TC-26	Output Plate Bypass
10	.05	400		484-05	DT4S5	ST-4-05	TC-15	Audio Coupling
11	.05	400		484-05	DT4S5	ST-4-05	TC-15	" "
12	.05	400		484-05	DT4S5	ST-4-05	TC-15	Tone Comp.
13	.05	400		484-05	DT4S5	ST-4-05	TC-15	Audio Coupling

*Parallel sections to obtain desired capacity.

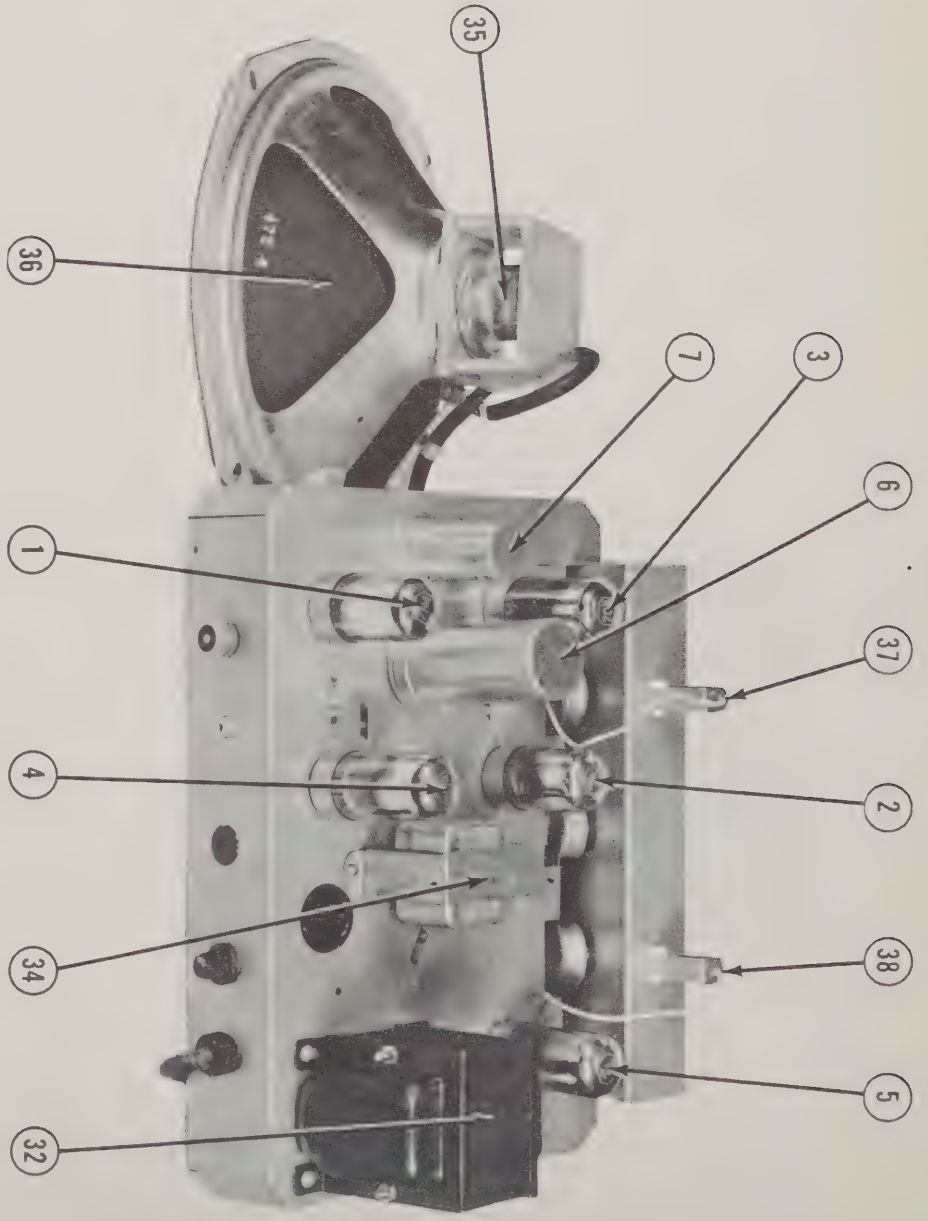
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: STARK PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
14A	500KΩ	½	IVC-500K	D11-133	M-58-S	Mike Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 14A per instructions
15A	500KΩ	½	IVC-500K	D11-133	M-58-S	Phono Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 15A per instructions
16A	250KΩ	½	IVC-250K	D11-130	M-55-S	Tone Control
B	Shaft		Not Req.	AA	Not Req.	Attach to 16A per instructions

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: STARK PART No.	IRC PART No.	IDENTIFICATION CODES
17	2 Meg.	½		BTS-2.2 Meg.	Red-Blk.-Grn. Mic. Amp. Grid
18	4000Ω	½		BTS-3900	Yl.-Blk.-Red Mic. Amp. Cathode
19	100KΩ	½		BTS-100K	Br.-Blk.-Yl. Mic. Amp. Plate Load
20	75KΩ	1		BTS-68K	Vi.-Grn.-Or. Mic. Amp. Plate Decoupling
21	500KΩ	½		BTS-470K	Grn.-Blk.-Yl. Isolation
22	500KΩ	½		BTS-470K	Grn.-Blk.-Yl. "
23	100KΩ	½		BTS-100K	Br.-Blk.-Yl. AF Plate Load
24	3900Ω	½		BTS-3900	Red-Blk.-Red AF Cathode
25	100KΩ	½		BTS-100K	Br.-Blk.-Yl. Phase Inverter Plate Load
26	10KΩ	½		BTS-10K	Br.-Blk.-Or. Phase Inverter Grid
27	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. Output Grid
28	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. " "
29	250Ω	10	IR-250-5WW	AB-250	Output Cathode
30	30KΩ	½		BTS-33K	Or.-Blk.-Or. Feedback
31	2KΩ	½		Bw-½-2.0	Red-Blk.-Br. "

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	STARK PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
32	117V AC @ .62A	640V CT @ .088A	6.6V AC @ 3.0A		ITP-410	P-4079#	T22R31#	P-3152#

#Drill new mounting holes.

FILTER CHOKE

ITEM NO.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ~)	STARK PART NO.	STANCOR PART NO.	THORDARSON PART NO.	MERIT PART No.	
33	.088A	270Ω	Henries	ITC-410	C-1709	T20C53	C-2993‡	‡Drill one new mounting hole.

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		STARK PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
34	11 KΩ CT	3.9Ω	450Ω CT	.4Ω	ITO-410	A-3870	T22S56	A-2004‡	‡Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
	FIELD	VC IMP.	STARK PART No.	JENSEN PART No.	QUAM PART No.	
35	PM	3.2Ω	ISP-10PM-32	ST-120† Mod. P10-S	10A31	†Replace output transformer to match 6-8Ω voice coil.
	CONE DIA.	VC DIA.				
36	9½"	1"				

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					STARK PART No.		
37	Bayonet	6-8	0.15	Brown			Type 47
38	"	"	"	"			" "

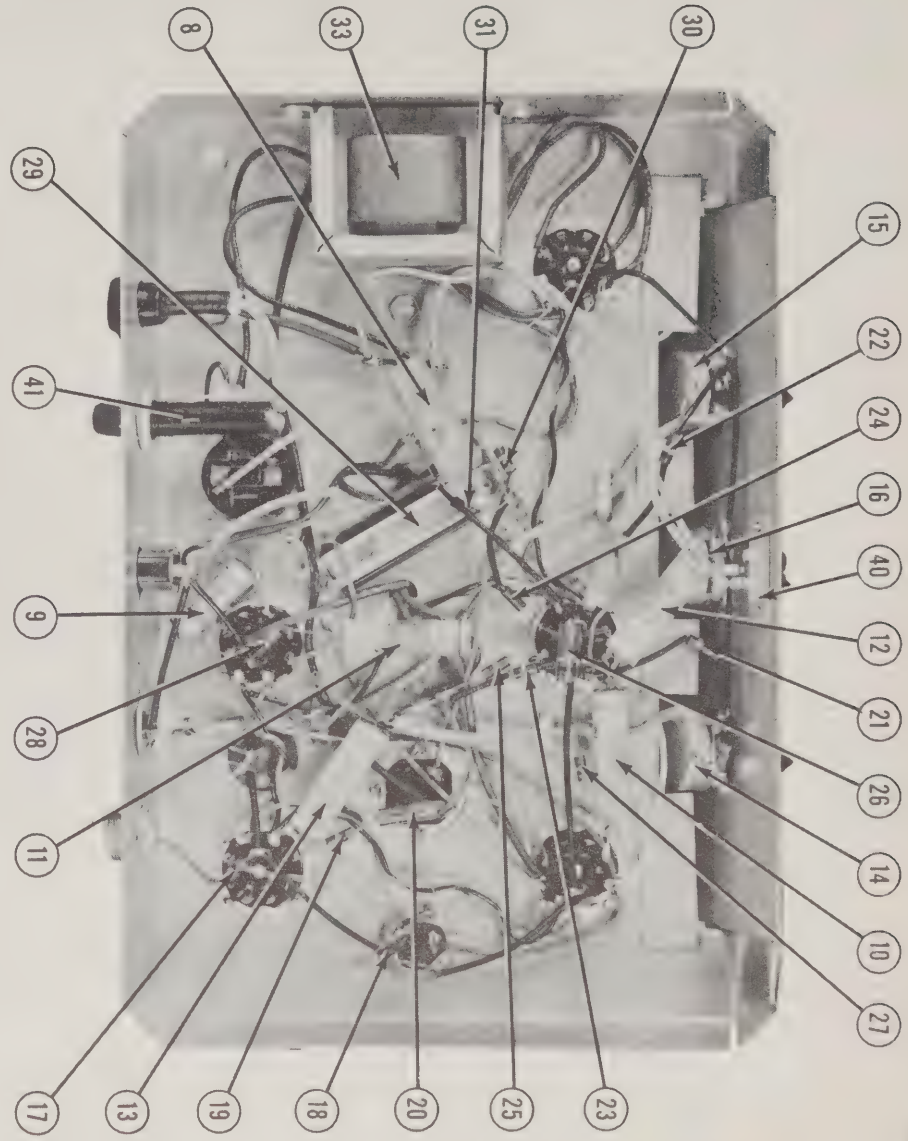
PHONO ARM AND CARTRIDGE

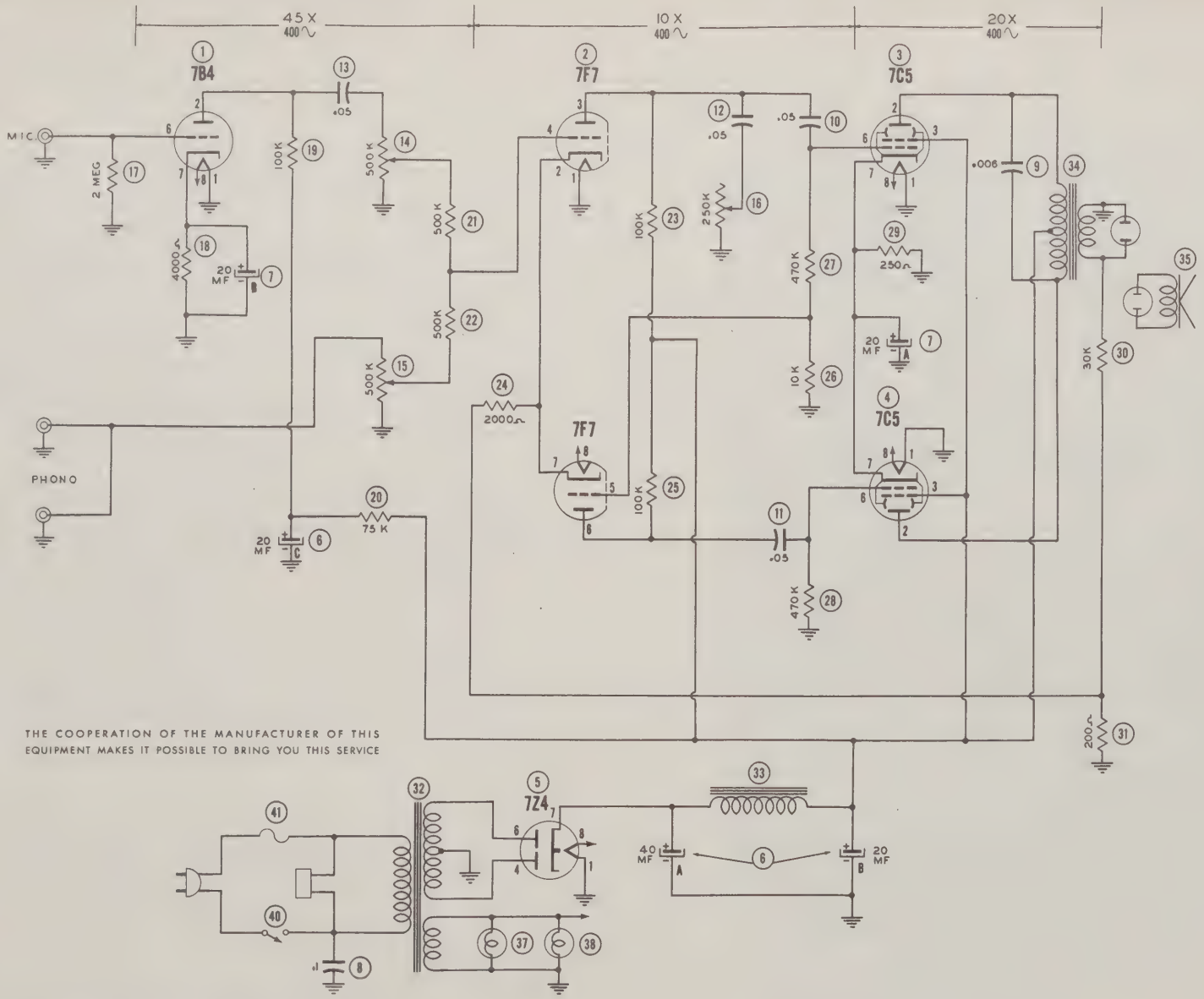
ITEM No.	REPLACEMENT DATA		REMARKS
	STARK PART No.	ASTATIC PART No.	
39A	IPHP-1§	507-L-40 or 510-QT-M	§Includes arm rest and cartridge.
B		L-70-A	L-70-AZ Original.

MISCELLANEOUS

ITEM No.	PART NAME	STARK PART No.	NOTES
40	Switch	ISW-SS1	Power
41	Fuse		2 Amp. (3AG)
	Knob	IKN-1	

CHASSIS—BOTTOM VIEW





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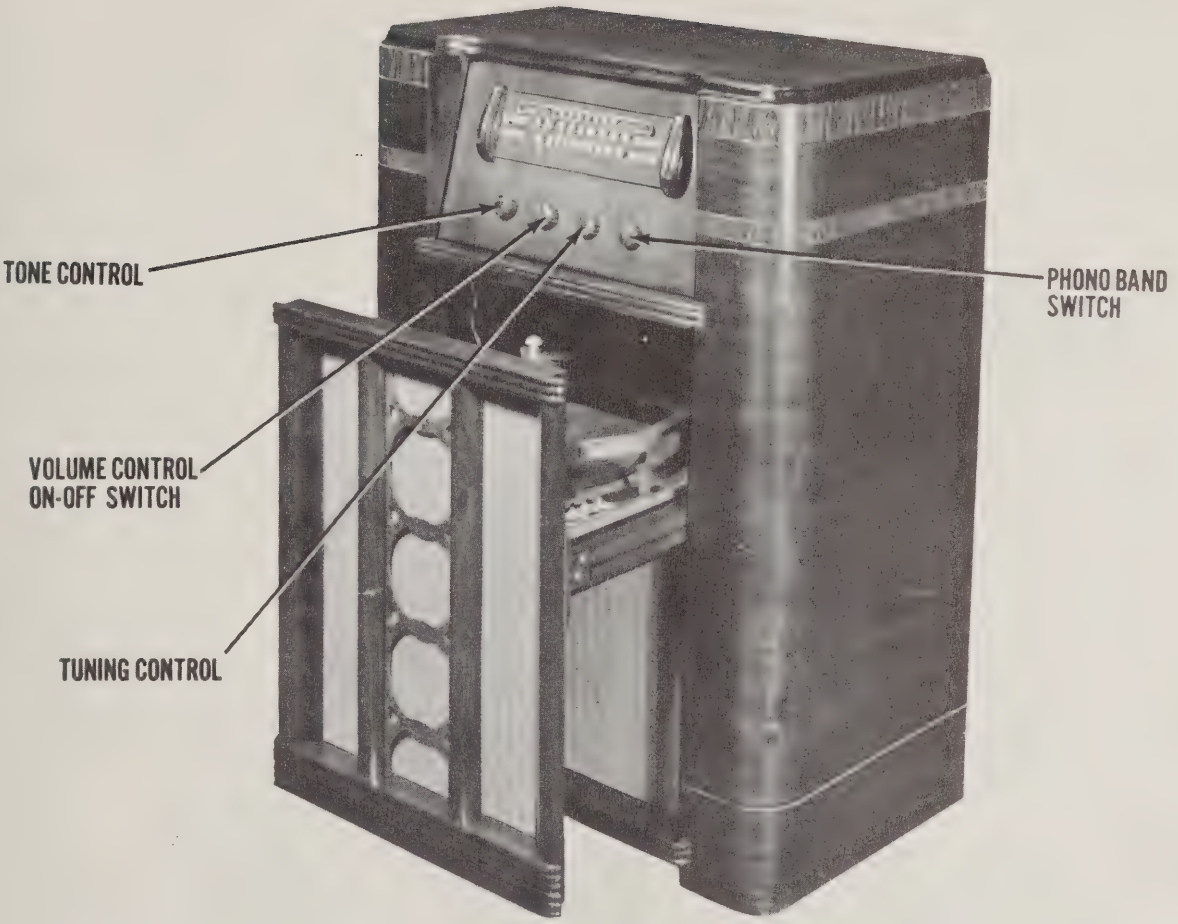
4810-22

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

TRUETONE MODELS D-1846A, D-1846B, D-1846C



TRUETONE MODELS D-1846A, D-1846B, D-1846C

TRUETONE MODEL D-1846A

TRADE NAME	Truetone, Models D-1846A, B, C
SUPPLIER	Western Auto Supply Co., 2107 Grand Ave., Kansas City, Mo.
TYPE SET	AC Operated Combination Phono Radio AM-FM Superheterodyne Receiver
TUBES (SEVEN)	Types, 6BE6 Converter, 6BA6 1st IF Amp., 6BA6 2nd IF Amp., 6AL5 Ratio Det., 6AT6 Det.-AVC-AF, 6V6GT Power Output, 5Y3GT Rectifier.
POWER SUPPLY	105-125 Volts AC
RATING	.54 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1600KC FREQ. MOD. 88-108MC

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

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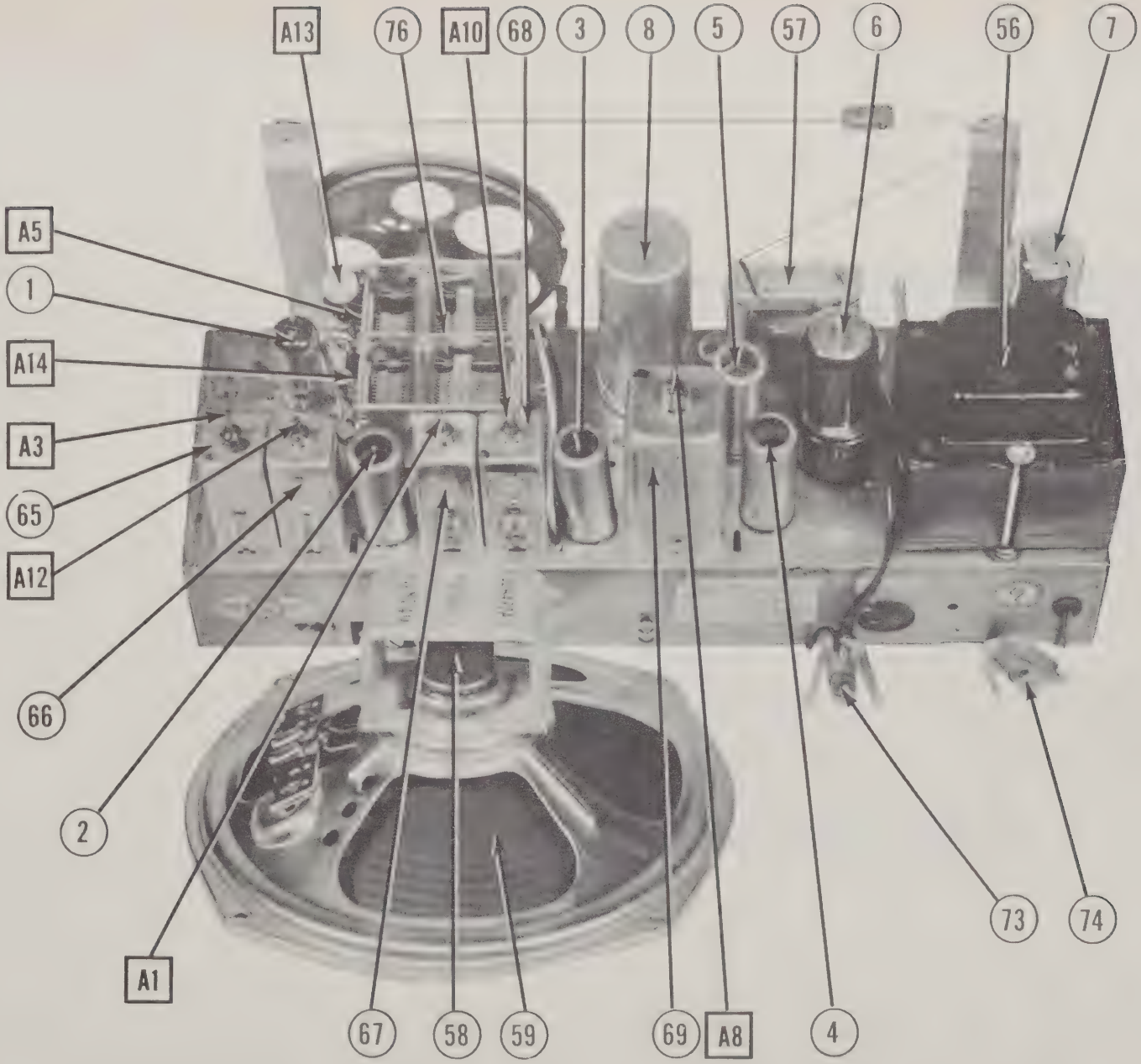
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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: TRUETONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	6BE6	6BE6	7CH	
2	1st IF Amp.	6BA6	6BA6	7BK	
3	2nd IF Amp.	6BA6	6BA6	7BK	
4	Ratio Det.	6AL5	6AL5	6BT	
5	Det.-AVC-AF	6AT6	6AT6	7BT	
6	Power Output	6V6GT	6V6GT	7AC	
7	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: TRUETONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
8A	40	350	45X359		UP43145C	DY-406	EL-424	Filter
B	40	350						"
C	20	350						"
D	20	25			BR2045		UT-203	Cathode Bypass
9	5	100	45X361	PRS150-4	BR415	M-8-150	UT-41	Stabilizing Cap.
10	.001	800	H66102	484-001	DT6D1	ST-6-001	TC-21	Output Plate Bypass
11	.004	200	B66402	484-004	DT6D4	ST-6-004	TC-24	Tone Compensation
12	.02	400	D66203	484-02	DT4S2	ST-4-02	TC-12	Audio Coupling
13	.005	400	D66502	484-005	DT6D5	ST-6-005	TC-25	" "
14	.04	200	B66403	484-04	DT4S4	ST-4-04	TC-14	Tone Compensation
15	.01	400	D66103	484-01	DT4S1	ST-4-01	TC-11	Conv. Screen Decoup.
16	.05	200	B66503	484-05	DT2S5	ST-4-05	TC-15	AVC Filter
17	220		45X468	1468-00025	5W5T25	M0.5-325	1FM-325	AF Plate Bypass-Cer.
18	68		47X471	1468-000075	5W5Q7	M0S.5-47	MS-47	Tone Comp.
19	470		47X510	1468-0005	5W5T5	M0.5-35	1FM-35	Diode Load Cap.
20	2700		47X492	1467-0025	1W5D25	MW.5-25	1FM-23	De-emphasis
21	5000		47X507	1467-005	1D5D5	MW.5-25	1FM-25	2nd IF Screen Bypass-Cer.
22	5000		47X507	1467-005	1D5D5	MW.5-25	1FM-25	2nd IF Cathode Bypass-Cer.
23	5000		47X507	1467-005	1D5D5	MW.5-25	1FM-25	1st IF Screen Bypass-Cer.
24	5000		47X507	1467-005	1D5D5	MW.5-25	1FM-25	1st IF Cathode Bypass-Cer.
25	5000		47X507	1467-005	1D5D5	MW.5-25	1FM-25	Conv. Plate Decoup.-Cer.
26	10		47X476	1468-00001	5W5Q1	M0.5-41	MS-41	Fixed Trimmer
27	100		47X597	1468-0001	5W5T1	M0.5-31	1FM-31	Fixed Screen Bypass-Cer.
28	5		47X513	1468-000005	5W5V5	M0.5-55	MS-55	Osc. Feedback-Cer.
29	47		47X517	1468-00005	5W5Q5	M0.5-45	1FM-45	Osc. Grid Cap.-Cer.
30	100		47X511	1469-0001	5R5T1	M0S.5-31	MS-31	Fixed Pad-Cer.
31	500		47X508	1468-0005	5W5T5	M0.5-35	1FM-35	Filament Bypass-Cer.
32A	50		"	1468-00005	5W5Q5	M0.5-45	1FM-45	Diode RF Filter-Cer.
B	50		"	1468-00005	5W5Q5	M0.5-45	1FM-45	" " " "

*Items 32A, 32B and 55 are a resistor capacitor combination obtained under Part #76X1.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: TRUETONE PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
33A	500KΩ	½	36X371	D13-133X	AT-78	Volume Control tapped @ 100KΩ
B	Shaft		Not Req.	E	KSS-3	Attach to 33A per instructions
C	Switch		" "	41	SW-A	" " " " "
34A	3 Meg.	½	40X284	D13-140	AM-67-Z	Tone Control
B	Shaft		Not Req.	E	KSS-3	Attach to 34A per instructions

PARTS LIST AND DESCRIPTIONS (Continued)

R F COILS

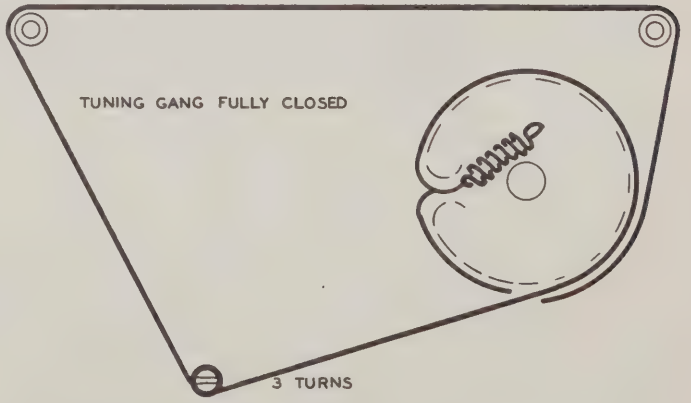
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: TRUETONE PART No.	REPLACEMENT DATA: MEISSNER PART No.
60	Loop Ant.	.1Ω	.8Ω	26A478	
61	Dipole Ant.			9A1900	
62	FM Ant.Coil		0Ω	9A1937	
63	BC Osc.Coil	.5Ω	5Ω	9A1929	14-1060
64	FM " "		0Ω	9A1938	
65	AM 1st IF	15.5Ω	15.1Ω	9A1934	16-6678
66	FM " "	.6Ω	.1Ω	9A1932	
67	AM 2nd IF	15Ω	15Ω	9A1935	16-6678
68	FM " "	.6Ω	.1Ω	9A1933	
69	FM Disc.	.9Ω	.1Ω	9A1936	
70	Plate Choke		.3Ω	9A1882	
71	Par. Supp. Choke		0Ω	9A1940	
72	Fil. Choke		.3Ω	9A1882	

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: TRUETONE PART No.	REPLACEMENT DATA	INSTALLATION NOTES
73	Bayonet	7.5	0.2V	White	17A32		Type 51
74	"	"	"	"	"		" "

MISCELLANEOUS

ITEM No.	PART NAME	TRUETONE PART No.	NOTES
75	Switch	2A373	Band-Phono
76	Tuning Gang	14A198	(18-534MMF, 30-206MMF)
A6	Trimmer	17A235	BC Ant. Adj.
A13	"	17A247	FM Osc. Adj.
	Dial	58X697	
	Dial Pointer	15X229	



DIAL CORD DRIVE

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	TRUETONE PART No.	IRC PART No.	
35	22KΩ	½	B84223	BTS-22K	Red-Red-Or. Oscillator Grid
36	3900Ω	½	B83392	BTS-3900	Or.-White-Red Converter Screen Decoupling-See Note
37	1200Ω	½	B84122	BTS-1200	Br.-Red-Red Converter Plate Decoupling
38	8200Ω	2	D84822	BT-2-8200	Gray-Red-Red Bleeder
39	68Ω	½	B83680		Blue-Gray-Blk. 1st IF Cathode
40	1200Ω	½	B84122	BTS-1200	Br.-Red-Red 1st IF Decoupling
41	2.2 Meg.	½	B85225	BTS-2.2 Meg.	Red-Red-Grn. AVC Network
42	68Ω	½	B83680		Blue-Gray-Blk. 2nd IF Cathode
43	1000Ω	½	B84102	BTS-1000	Br.-Blk.-Red 2nd IF Decoupling
44	27KΩ	½	B84273	BTS-27K	Red-Vi.-Or. De-emphasis
45	6800Ω	½	B84682	BTS-6800	Blue-Gray-Red Ratio Detector Diode Load
46	6800Ω	½	B84682	BTS-6800	" " " " " "
47	1 Meg.	½	B85105	BTS-1 Meg.	Br.-Blk.-Grn. AVC Network
48	470KΩ	½	B85474	BTS-470K	Yl.-Vi.-Yl. Series Phono
49	15KΩ	½	B84153	BTS-15K	Br.-Grn.-Or. Tone Compensation
50	10 Meg.	½	B85106	BTS-10 Meg.	Br.-Blk.-Blue AF Grid
51	470KΩ	½	B85474	BTS-470K	Yl.-Vi.-Yl. AF Plate Load
52	470KΩ	½	B85474	BTS-470K	Yl.-Vi.-Yl. Output Grid
53	270Ω	½	B84271	BW-½-270	Red-Vi.-Br. Output Cathode
54A	1400Ω	6	43X224	AB-1450	Filter
B	1000Ω	4		AB-1000	"
55	47KΩ	½	*	BTS-47K	Diode RF Filter

Note-Some models use 4700Ω in this application. IRC replacement BTS-4700
*Items 32A, 32B and 55 are a resistor capacitor combination obtained under Part #76X1.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	TRUETONE PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
56	117V AC @ .54A	520V CT @ .082A	5.1V AC @ 2.0A	6.3V AC @ 2.5A	53X290		T22R02†	

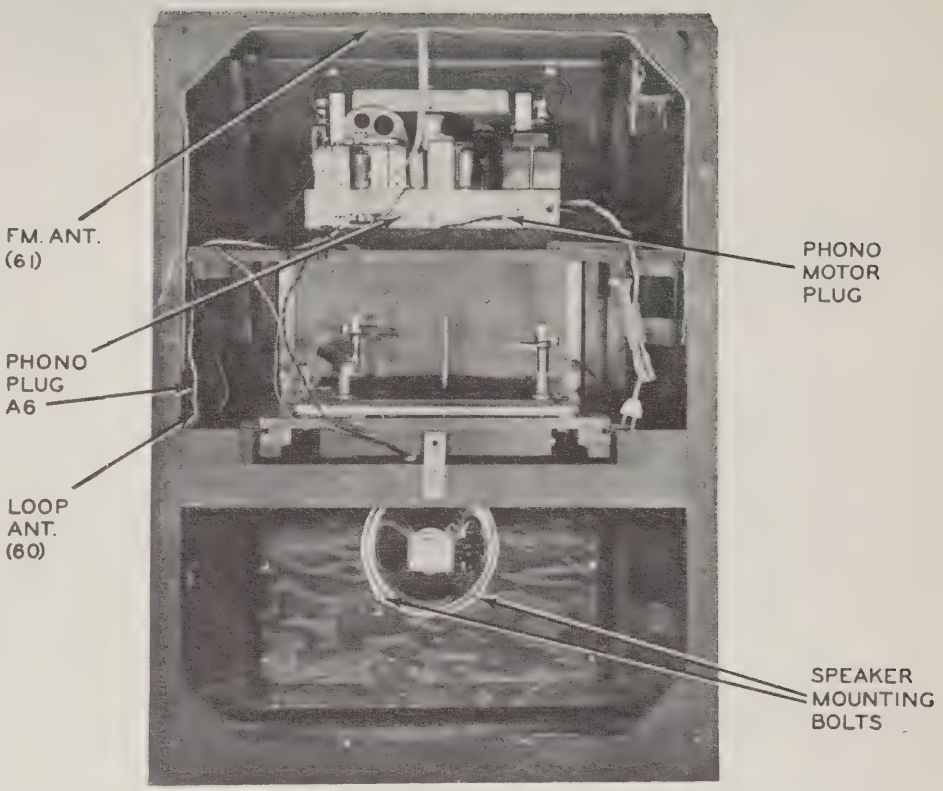
†Drill new mounting holes.

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		TRUETONE PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
57	4100Ω	3.6Ω	475Ω	.2Ω	51X134	A-3823	T22S87	A-2502	

SPEAKER

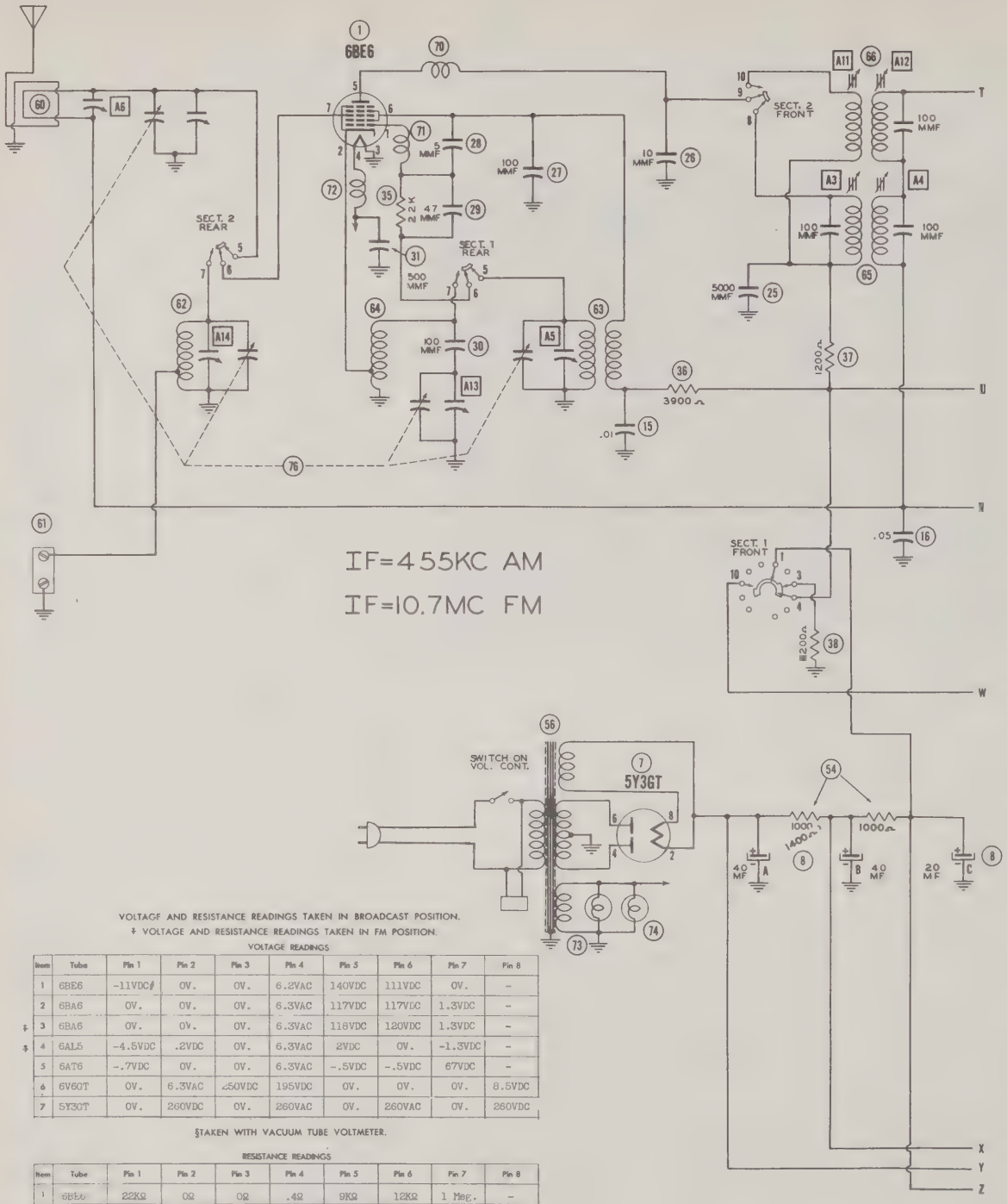
ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
	FIELD	VC IMP.	TRUETONE PART No.	JENSEN PART No.	QUAM PART No.	
58	PM	3.0Ω	12A477	ST-115 Mod. P8-V	6A21	
59	CONE DIA. 7-3/8"	VC DIA. 11/16"				



DISASSEMBLY INSTRUCTIONS

1. Remove four push-on type control knobs.
2. Remove antenna leads from loop antenna.
3. Remove FM dipole leads from terminal strip on rear of chassis.
4. Remove phono-motor plug from chassis.
5. Remove phono-pickup plug from chassis.
6. Remove speaker leads from speaker.
7. Remove dial glass from cabinet.
8. Remove three hex head screws holding chassis in cabinet.
9. Remove three Phillips head wood screws holding dial pointer slide in cabinet. Remove slide from cabinet.
10. Remove chassis from cabinet.
11. Remove four wood screws holding speaker in cabinet. Remove speaker from cabinet.

DATE 5/48-#4810-23 SST #40-FOLDER #23



VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.
‡ VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6BE6	-11VDC‡	0V.	0V.	6.2VAC	140VDC	111VDC	0V.	-
2	6BA6	0V.	0V.	0V.	6.3VAC	117VDC	117VDC	1.3VDC	-
‡ 3	6BA6	0V.	0V.	0V.	6.3VAC	118VDC	120VDC	1.3VDC	-
‡ 4	6AL5	-4.5VDC	.2VDC	0V.	6.3VAC	2VDC	0V.	-1.3VDC	-
5	6AT6	-.7VDC	0V.	0V.	6.3VAC	-.5VDC	-.5VDC	67VDC	-
6	6V6GT	0V.	6.3VAC	250VDC	195VDC	0V.	0V.	0V.	8.5VDC
7	5Y3GT	0V.	260VDC	0V.	260VAC	0V.	260VAC	0V.	260VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6BE6	22KΩ	0Ω	0Ω	.4Ω	9KΩ	12KΩ	1 Meg.	-
2	6BA6	1 Meg.	0Ω	0Ω	.1Ω	9KΩ	9KΩ	68Ω	-
‡ 3	6BA6	.1Ω	0Ω	0Ω	.1Ω	1 Meg.	1 Meg.	68Ω	-
‡ 4	6AL5	500KΩ	100KΩ	0Ω	.1Ω	6.8KΩ	INF.	6.8KΩ	-
5	6AT6	10 Meg.	0Ω	0Ω	.1Ω	550KΩ	550KΩ	470KΩ	-
6	6V6GT	INF.	.1Ω	10KΩ	9KΩ	470KΩ	0Ω	0Ω	25Ω
7	5Y3GT	INF.	10KΩ	INF.	150Ω	INF.	160Ω	INF.	10KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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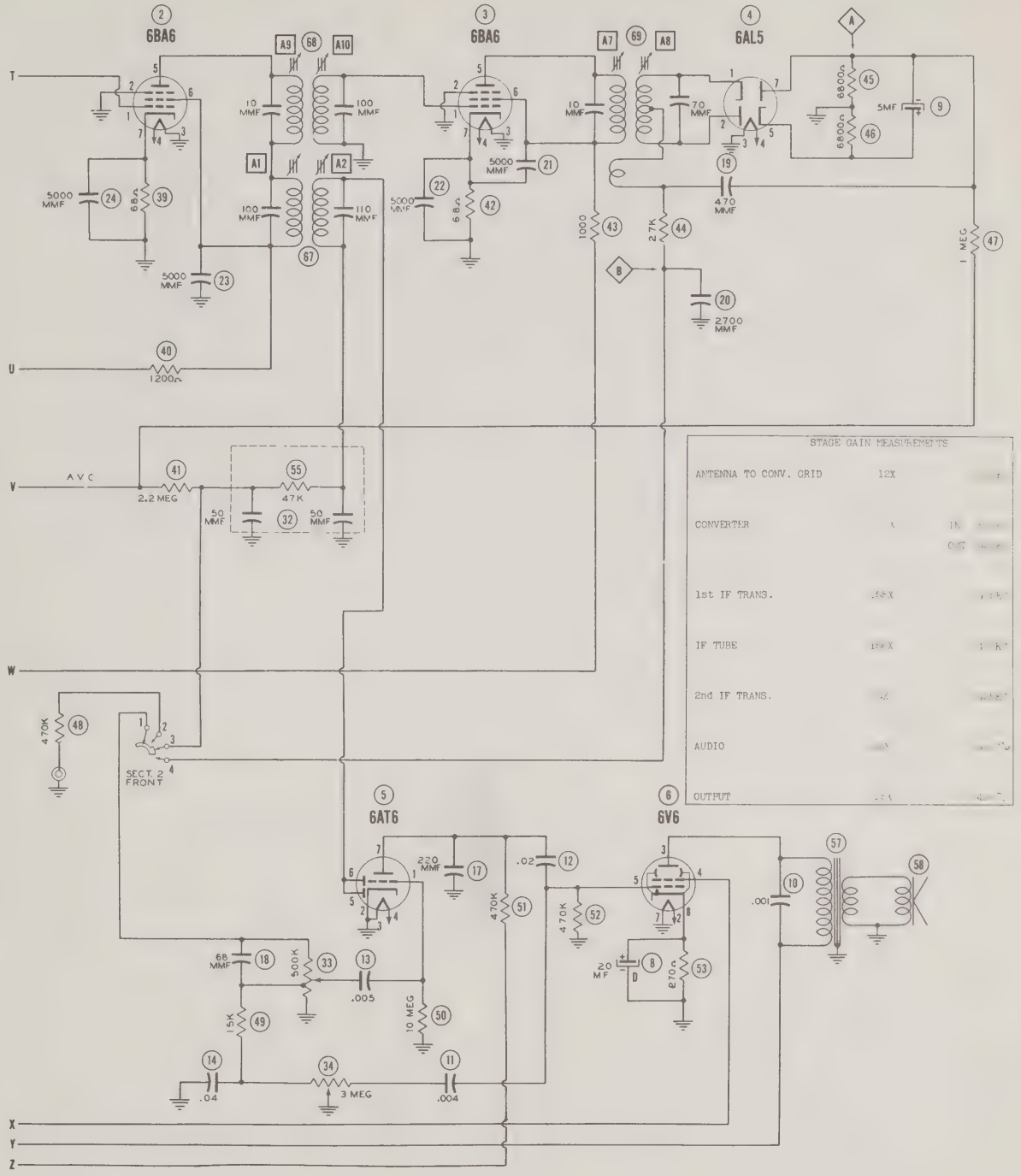
4810-23

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.



THE COOPERATION OF THE MANUFACTURER OF THIS
RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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4810-23

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use insulated alignment screwdriver for all aajustments.

Allow receiver and signal generator to warm up for about 15 minutes prior to attempting alignment.

AM ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to Pin 1 (grid) 6BA6 IF Tube (2). Low side to chassis.	455KC	BC (center position)	Tuning cap. fully open.	Across voice coil	A1,A2	Adjust for maximum output.
2	.1 MFD.	High side to Pin 7 (grid) 6BE6. Low side to chassis.	455KC	"	"	"	A3,A4.	" " " "
3	.1 MFD.	"	1620KC	"	"	"	A5	" " " "
4	50MMFD	High side to ext. ant. clip. Low side to chassis.	1400KC	"	Tune for maximum output.	"	A6	Adjust for maximum output. Set pointer to 1400KC calibration mark. (Trimmers on ant. stator of tuning cap. are factory adjustments and ordinarily need not be changed.)

FM ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5	.01 MFD.	High side to Pin 1 (grid) 6BA6 2nd IF Tube (3). Low side to chassis.	10.7MC (unmodulated)	FM (fully clockwise)	Tuning cap. fully open.	DC probe to Point (A). Common to chassis	A7	Adjust for maximum deflection.
6	.01 MFD	"	"	"	"	DC probe to Point (B). Common to chassis	A8	Use a zero centered VTVM if available. Adjust for zero deflection. Repeat Steps 5 & 6 until no further improvement can be made.
7	.01 MFD	High side to Pin 1 (grid) 6BA6 1st IF Tube (2). Low side to chassis.	"	"	"	DC probe to Point (A). Common to chassis	A9,A10	Adjust for maximum deflection. Attenuate signal to give same maximum reading as obtained in Step 5.
8	.01 MFD	High side to Pin 7 (grid) 6BE6. Low side to chassis.	"	"	"	"	A11, A12	"
9	300Ω carbon res	Disconnect built in FM ant. lead. High side sig. gen. in series with 300Ω resistor to ungrounded FM ant. terminal. Low side to chassis.	108.5MC (unmodulated)	"	"	"	A13	Adjust for maximum deflection.
10	"	"	104.5MC (unmodulated)	"	Tune for maximum deflection.	"	A14	Rock tuning cap. and adjust for maximum deflection. Repeat Steps 9 & 10 until no further improvement can be made.

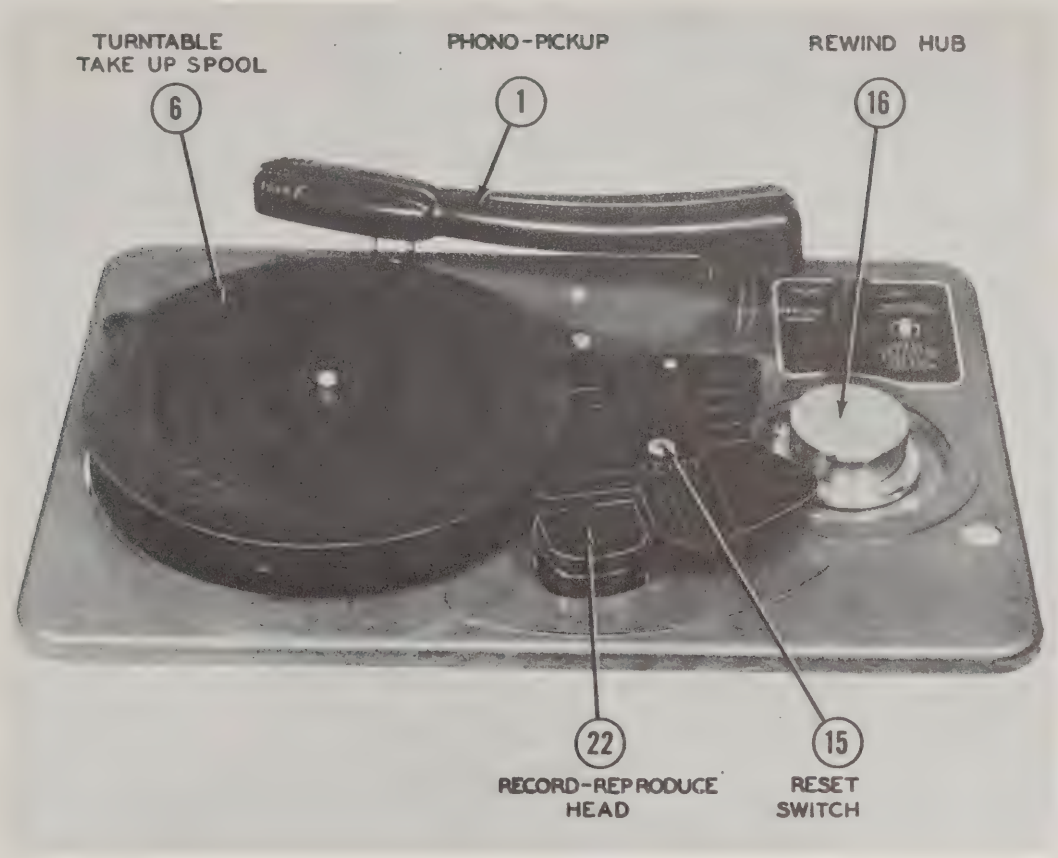
FM ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
5	.01 MFD	High side to Pin 1 (grid) 6BA6 1st IF Tube. Low side to chassis.	10.7MC (Freq. modulated)	FM (fully clockwise)	Tuning cap. fully open.	Vertical input to Point (A). Ground to chassis.	A7,A10, A9	Disconnect 5 MFD cap. from Point (A). Adjust A7, A10 & A9 for maximum amplitude, symmetry & coincidence of pattern per Fig. 1.
6	.01 MFD	Disconnect lead from Pin 7 (grid) 6BE6 to switch. Connect 100KΩ resistor from Pin 7 to chassis making leads as short as possible. High side of sig gen. to Pin 7. Low side to chassis.	"	"	"	"	A12, A11	Adjust for maximum amplitude, symmetry & coincidence of pattern per Fig. 1.
7	.01 MFD	Remove 100KΩ resistor from Step 6. Reconnect Pin 7 6BE6 to switch. High side to Pin 1 (grid) 6BA6 1st IF Tube. Low side to chassis.	"	"	"	Vertical input to Point (B). Ground to chassis.	A8	Reconnect 5 MFD to Point (A). Adjust A8 for maximum straightness of crossover lines with crossover occurring at center of Pattern of Fig. 2.
8	300Ω carbon res.	Remove built in FM Ant. lead from FM ant. terminal strip. High side of sig gen. to ungrounded FM ant. terminal. Low side to chassis.	108.5MC (Freq. Mod.)	"	"	Vertical input to Point (A). Ground to chassis.	A13	Disconnect 5 MFD cap. from Point (A). Adjust A13 for coincidence of pattern of Fig. 1.
9	"	"	104.5MC (Freq. Mod.)	"	Tune for coincidence.	"	A14	Adjust for maximum amplitude of pattern of Fig. 1. Repeat Steps 8 & 9 until no further improvement can be made. Reconnect 5 MFD cap. to Point (A).

FIG. 1

FIG. 2



TOP VIEW

GENERAL INFORMATION

The St. George wire recorder is a combination record player and magnetic recorder-reproducer. The turntable serves not only as a turntable for standard records, but also as the take up spool for the wire recording mechanism. Two motors are used; one as a rim drive for the turntable, and the other as a direct drive for the rewind hub. The standard spool of wire contains enough .004" stainless steel wire for over an hour of continuous recording. Turntable speed is approximately 80 RPM. Wire speed is approximately two feet per second. Rewind speed is limited only by the friction of the system and the inherent speed limit of the four-pole motor and will be many times the forward speed. The one-hour spool can be rewound in approximately 8 minutes or less.

A plastic tape leader is used to thread the wire on to the turntable and to trip the reset switch to shut off the motor at the end of rewind.

Manufactured by
ST. GEORGE RECORDING EQUIPMENT CORP.
76 Varick Street, New York 13, N. Y.

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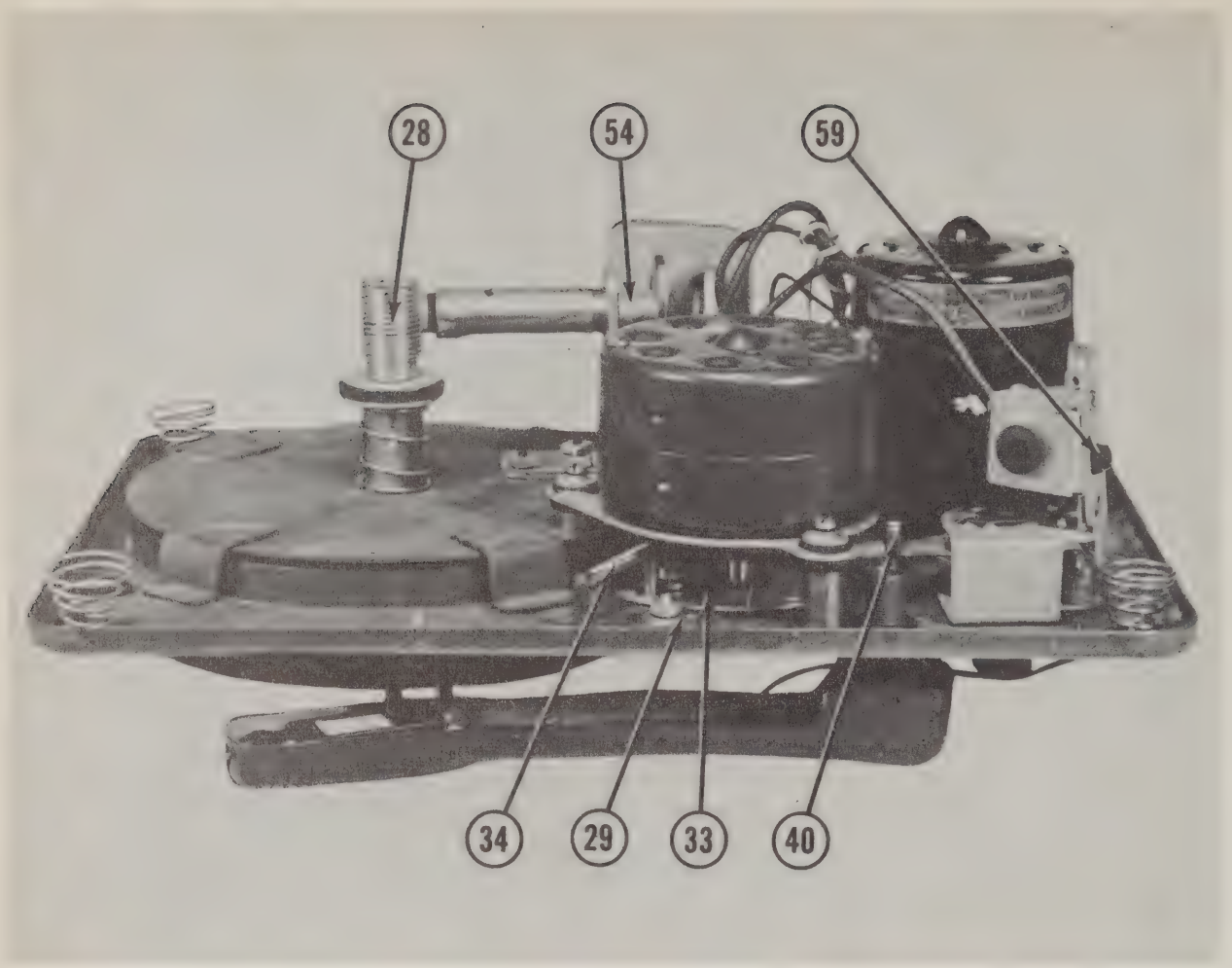
Date: 5/48 — 4810-24 Set 40, Folder 24

ST. GEORGE SERIES 1100
WIRE RECORDER

ST. GEORGE SERIES 1100
WIRE RECORDER



REAR VIEW

OPERATION

Before the wire is threaded on the machine the record head should first be brought to the top of its travel. This may be done by rotating the turntable by hand. If this is not done the wire pull will not be phased properly with respect to the rewind and "wows" may result.

Place the wire on the rewind hub, label side up—notch side down—being careful not to line up the notch with the ball in the hub. The notch is not used in connection with the ball and should not be aligned. Press on the spool until it is firmly seated.

Loosen the end of the tape leader from the spool and pull it past the recorder head. Place the leader in the channel of the turntable and while pressing the leader against the inner edge of the channel rotate the turntable until about two turns of wire are in the channel. Be very careful that the entire length of the leader is pressed firmly into the channel. If it is not well seated speed variations will result.

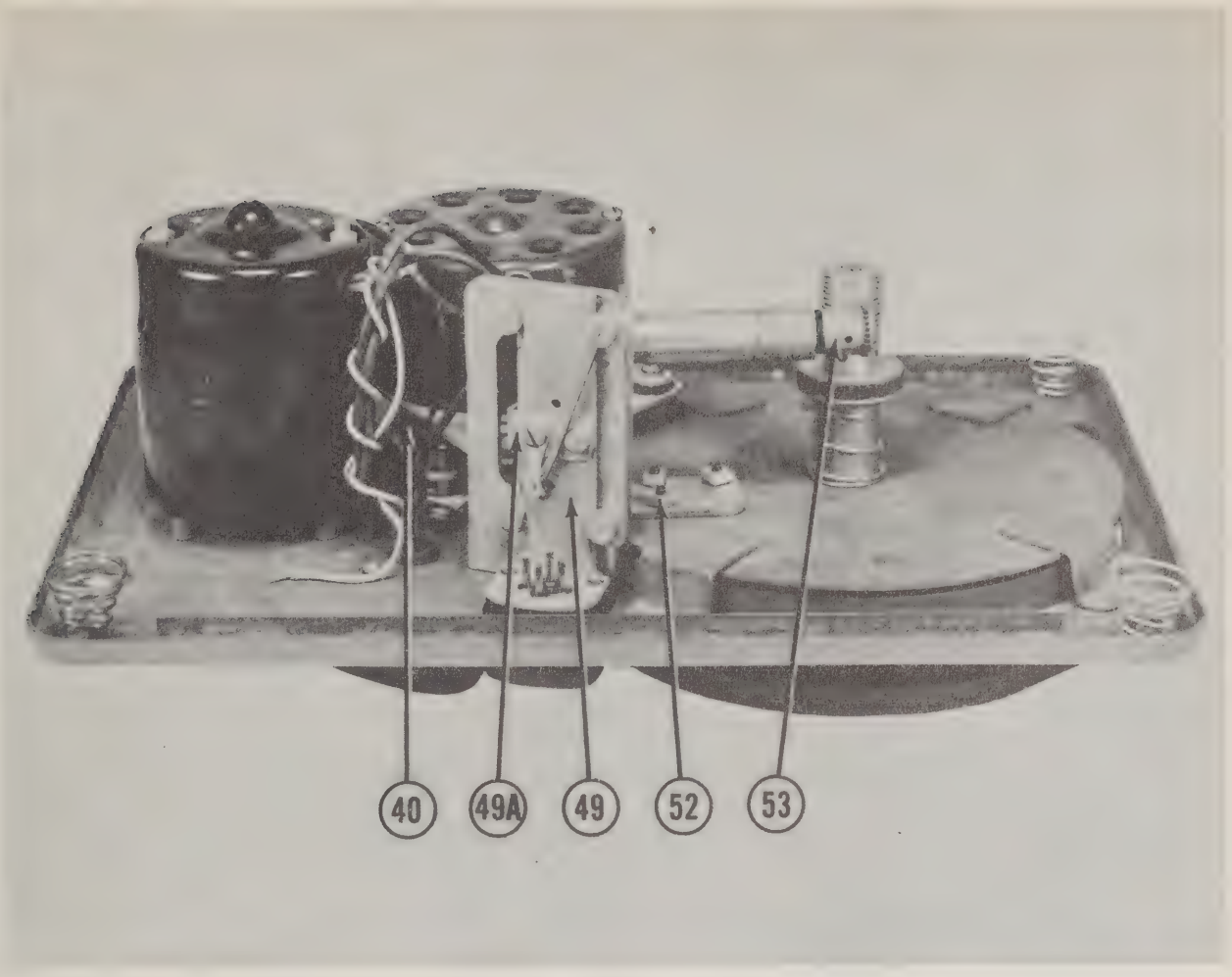
Press the "Reset" button to be sure this switch is on. When changing the position of the recorder control switch lever (7) it should be snapped quickly from one position to the other.

ADJUSTMENTS

Idler Tension:

The drive pulley tension is adjusted so that the recorder will neither break the wire nor throw it when the switch is turned from rewind to play. The adjustment is made by means of the eccentric washer (29).

An easy way to make this adjustment is by means of a stroboscope disc. By moving the ec-



FRONT VIEW

centric washer, the turntable may be brought to 80 RPM with a minimum of wow. This will probably be the correct adjustment to prevent wire breakage and spilling. If not, the washer can be moved slightly in either direction until the best adjustment is reached. When switching from high speed rewind to play, the turntable should continue for about one-half turn before reversing. If it stops too quickly the wire is likely to break, while if it coasts too easily the wire will spill off the spools.

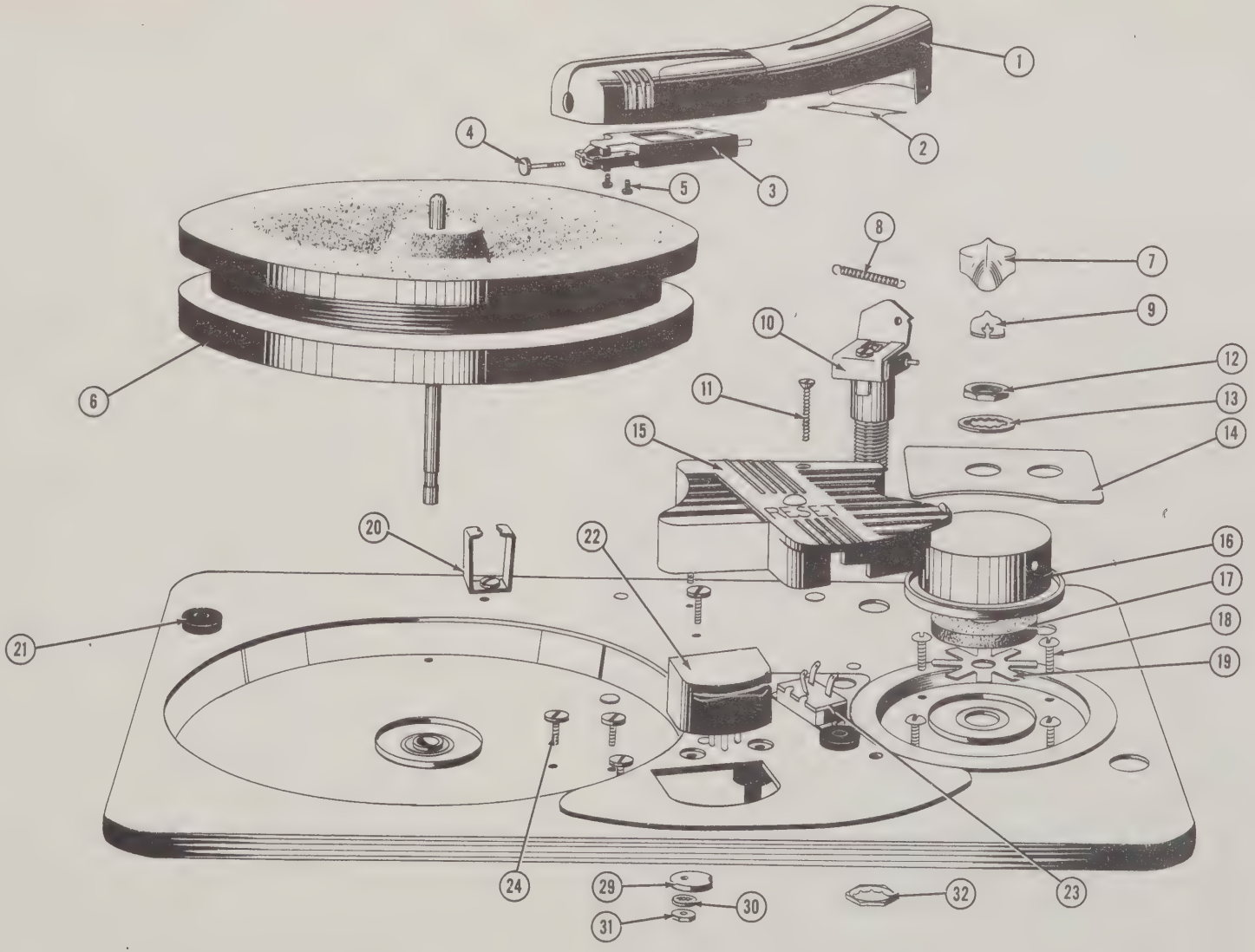
Level-Wind Gear:

Two different size gears have been used with this recorder. Early models used a 51-tooth gear, while the later models have used a 27-tooth gear. The 27-tooth gear may be used as a replacement in either case, since there is sufficient play in the mounting bracket to permit adjustment. The smaller gear is used to increase the rate of level-wind.

The cam assembly bracket should be adjusted to mesh the gear with the worm as closely as possible without binding at any point of its rotation. The adjustment is made by loosening the three mounting nuts (52) and sliding the bracket. Be sure that the cam does not bind on the slide bracket when the adjustment is completed. If necessary, the slide bracket (47) may be moved slightly to prevent binding, so long as this does not cause the recording head to touch the baseplate.

Level-Wind:

At the bottom of the level-wind stroke the lamination slot in the recording head should be approximately 1/16" above the baseplate. This may be adjusted by loosening the two screws holding the pin extension (49A) and moving the pin up or down until the proper adjustment is reached.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A PHOTOFACT "EXPLODED" VIEW
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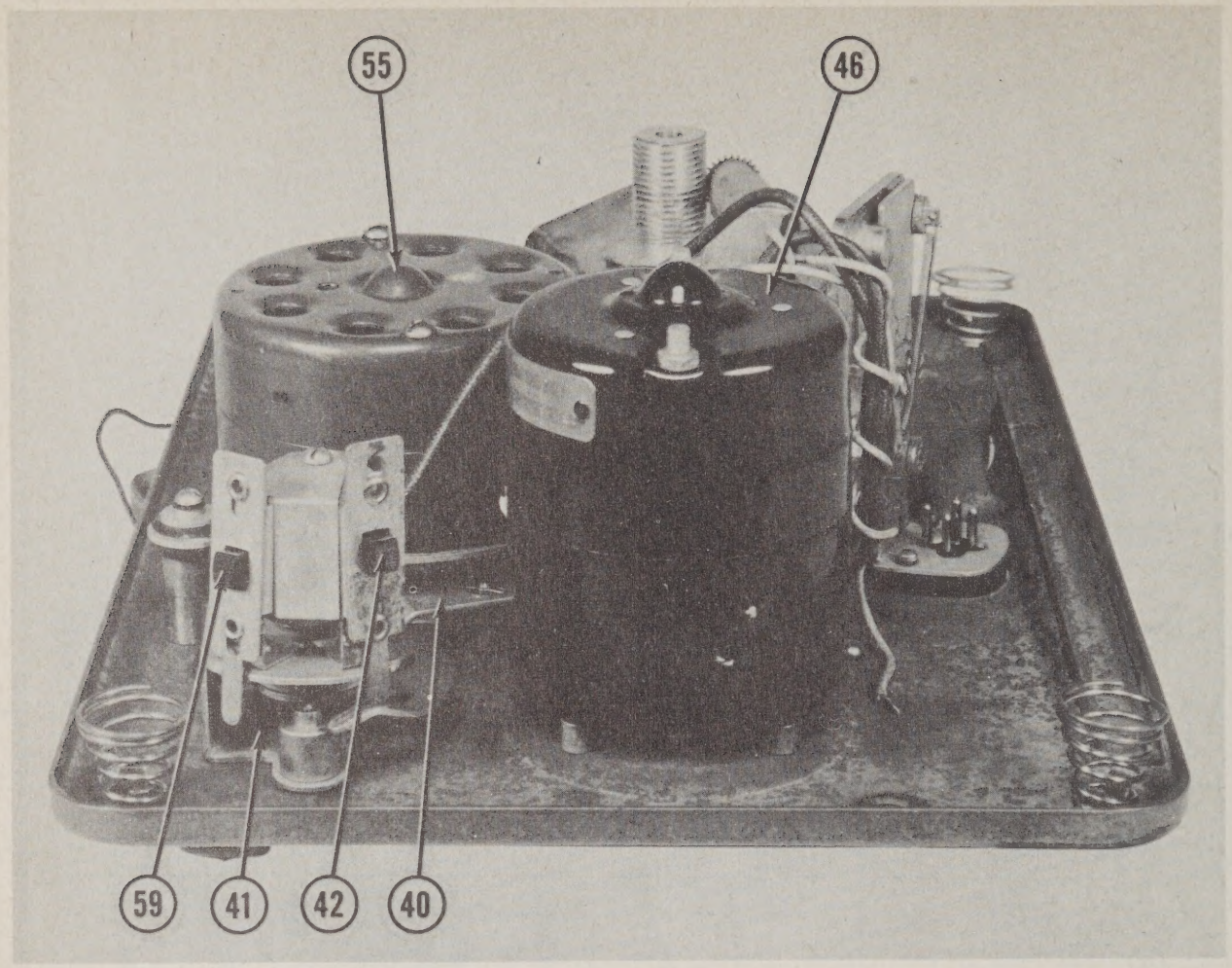

SIDE VIEW

TROUBLES

Only One Motor Will Operate:

The transfer switch (23) is probably inoperative due to the actuating lever jumping over the top of the switch button. Be sure the nut (38) which holds the idler bracket is tight. The shoulder washer and spring washer should allow the bracket to slide freely without climbing over the switch button. The bracket may be straightened if bent.

Wire Reproduction Weak:

Weak reproduction, when not accompanied by high distortion, is probably due to dirt or wire slivers in the recording gap. Clean the gap with a sharp knife.

Wire Breaks or Throws Off Spools:

Wire breakage or spilling is probably due to improper adjustment of idler tension. This may be corrected by adjusting the eccentric washer (29) which serves as a stop for the idler bracket. Adjust the turntable speed to approximately 80 RPM with the wire threaded as for play.

Weak and Distorted Recording:

Distorted recording will probably be due to a failure in the bias circuit. Further evidence of this will be failure to erase properly. A likely cause will be failure of the switch (59) to close completely. This may be remedied by bending the actuator arm until complete closure is effected. If the switch is not at fault check the output of the erase oscillator with an AC vacuum tube voltmeter across pins 2 and 3 of the record head, with the record head connected. The voltage should be approximately 2½ volts at 40 kc. If the voltage is low, check the oscillator tube and components.

Hum:

A high hum level when playing wire recordings is frequently caused by leakage from motor windings to the baseplate. All resistances read from the motor windings to the baseplate should be greater than two megohms.

PRINCIPLES OF MAGNETIC RECORDING

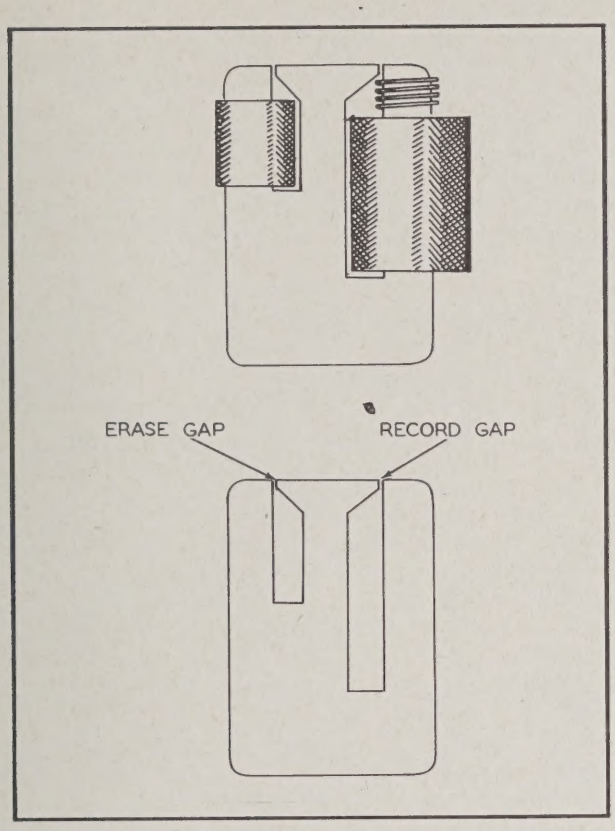

FIG. 1—RECORDING HEAD

The idea of magnetic recording dates back more than 50 years to the Danish physicist, Valdemar Poulsen. Though he was able to demonstrate the system successfully, the reproduction was poor and the system very bulky. Since that time, several models have been built, but the high cost and relatively poor reproduction prevented commercial acceptance.

When unmagnetized iron is subjected to a gradually increasing magnetic field it is at first difficult to magnetize. It then goes through a range where the magnetization increases rapidly, and as saturation is approached it again slows down. The result is a very crooked magnetization curve somewhat similar to the grid voltage-plate current curve of a vacuum tube. This means that any attempt to record sound on a wire without some means of bias will result in a very high percentage of distortion.

Early attempts to correct this difficulty relied on the fact that as the magnetization was reduced below saturation by an opposing field a portion of the resulting curve was comparatively straight. This led to the system of D.C. bias in which the wire was first passed through a strong unidirectional field then through the recording head in which the signal was mixed with a weak opposing field. Distortion was decreased, but the noise level was high and the full magnetic capabilities of the wire were not realized.

Also, most early systems magnetized across the wire. Since any rotation of the wire on its axis would decrease its effectiveness, this made it necessary to use tape which was usually much more bulky. Attempts to use longitudinal magnetization resulted in designs which required complicated adjustment, resulting in high cost.

The modern wire recorder uses longitudinal magnetization in a system that requires no adjustment. Also the D.C. bias is replaced by a high frequency bias. The frequency used is of the order of 30 to 40 kilocycles. This is well above audibility, and actually is not recorded, though if it is much lower than 30 kc. audible beats may be formed with the upper frequencies of the signal.

The high frequency bias system has several advantages over the earlier systems. Among these are low noise, low distortion, full use of the magnetic capabilities of the wire, and elimination of even harmonics as in a push-pull stage. The record, reproduce, and erase heads can be combined in one unit and made on mass production scale, leading to low costs.

The St. George recording head is illustrated in Fig. 1, with a schematic in Fig. 2. As the wire passes across the head from left to right it first passes the erase gap. Here it is subjected to a high intensity ultra-sonic field generated by the erase coil. The erase coil consists of a few turns of wire fed with about four watts from the oscillator. The high intensity field erases any previous recording that may be on the wire, and leaves the wire in a magnetically neutral state.

The wire next travels past the record gap. Here two coils provide flux. A few turns of the erase winding are used to provide bias, while the signal is applied to the voice coil, which consists of several thousand turns of wire.

In "reproduce" position the oscillator is disabled and the voice coil is used alone to convert changes in magnetism to electrical currents.

The plastic housing for the recording head is made in such a way that the wire is led down into a groove in the lamination to insure a good magnetic circuit. The shape of the groove and housing causes a knot in the wire to lift out of the groove. Since the wire travels at two feet per second, the small fraction of a second required for a knot to pass will not be heard.

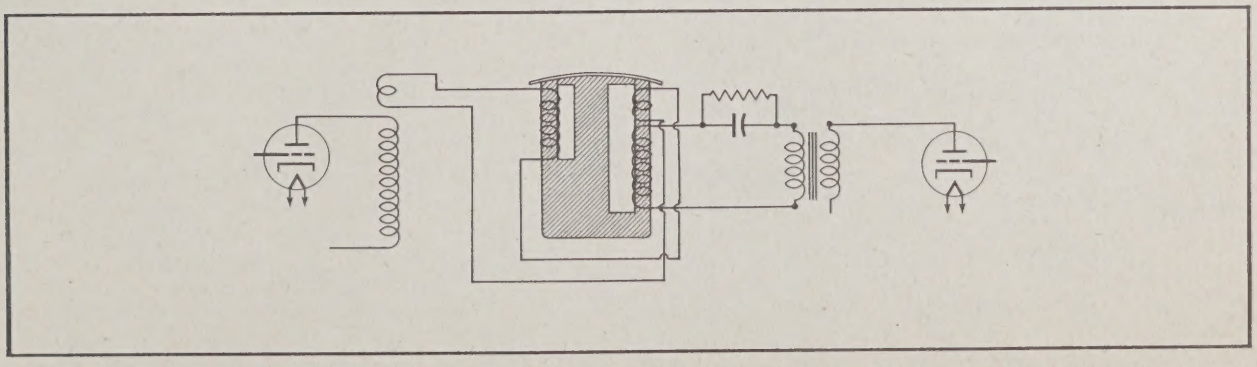

FIG. 2—SCHEMATIC

PARTS LIST

Ref. No.	Part No.	DESCRIPTION
1	241	Pickup arm
2	Part of 241	Wire retainer clip
3	Part of 241	Crystal cartridge
4	Part of 241	Needle screw
5	Part of 241	Cartridge mounting screw
6	6	Turntable and take up spool
7	243	Switch lever
8	Part of 241	Counterbalance spring
9	124	Switch indicator
10	Part of 241	Pickup arm bracket
11		No. 4-36 x 1" F.H.M.S.
12	122	Switch bracket mounting nut
13	123	Lock washer
14	57	Switch escutcheon
15	162	Reset switch bracket
16	204	Rewind spool hub
17	59	Rewind spool pad
18		Motor mounting screw
19	154	Star spring
20	77	Pickup arm rest
21		Grommet
22	260	Pickup and recording head
23	40	Transfer switch
24		Cam assembly mounting screw
25	93	Compression spring
26	58	Keyed washer
27	59	Felt washer
28	203	Level-wind drive worm
29	186	Eccentric washer
30		Lock washer

Ref. No.	Part No.	DESCRIPTION
31		No. 6-32 hex nut
32	Part of 241	Pickup arm mounting nut
33	206	Idler bracket
34	163	Idler tension spring
35	192	Spring washer
36	164	Shoulder washer
37		Lock washer
38		No. 6-32 hex nut
39	98	Flat washer
40	202	Idler control lever
41	129	Switch bracket
42	Part of 129	Power switch
43	55	Spring clip
44	133	Idler pulley
45	48	Motor mounting spacer
46	180	Rewind motor
47	211	Level-wind slide bracket
48		Recorder head mounting screw No. 4-40 x 3/8"
49	1	Level-wind slide
50	194	Cam assembly bracket
51		Lock washer
52		Cam assembly mounting nut
53	195	Level-wind gear
54	136	Level-wind cam
55	216	Drive motor
56		Flat washer
57		Lock washer
58		Motor mounting screw
59	Part of 129	Oscillator switch